Ontario
Ministry of
Northern Development
and Mines

Mines and
Minerals
Division

Peat and Peatland Resources of Northwestern Ontario

Ontario Geological Survey
Miscellaneous Paper 144

J.L. Riley and L. Michaud

1989

90-01899/.

© 1989 Queen's Printer for Ontario
Printed in Ontario, Canada

ISSN 0704-2572
ISBN 0-7729-6136-0

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Canadian Cataloguing in Publication Data

Riley, John L. Peat and peatland resources of northwestern Ontario

(Ontario Geological Survey miscellaneous paper,
ISSN 0704-2572 ; 144)
ISBN 0-7729-6136-0

1. Peat--Ontario. I. Michaud, Livain, 1957- . II. Ontario. Mines and Minerals Division. III. Ontario Geological Survey. IV. Title. V. Series.

TN840.C3R44 1989 553.2'1'097131 C89-099660-1

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Parts of this publication may be quoted if credit is given. It is recommended that reference be made in the following form:

Riley, J.L. and Michaud, L. 1989. Peat and peatland resources of northwestern Ontario; Ontario Geological Survey, Miscellaneous Paper 144, 175p.

Scientific Editor: C.A. Tchoryk

Maracle–1000–89

Foreword

The Ontario Peatland Inventory Project was a component of the Hydrocarbon Energy Resources Program (HERP) of the Ontario Geological Survey. The inventory of the peat and peatland resources of major regions of Ontario is intended to provide information on the possible energy and horticultural potential of the resource, and to assist the government of Ontario and other agencies in land use planning and disposition by assembling data on the distribution, frequency and types of peatlands.

During the course of the Peatland Inventory, 16 large study areas were the focus of detailed field surveys, reconnaissance and remote sensing studies, and laboratory analyses of peat materials. The detailed field studies and a manual on laboratory methods have also been published by the Ontario Geological Survey.

This report is one of three regional summaries of the Peatland Inventory. The inventory covered approximately 88 000 km^2 in northwestern Ontario, specifically the Armstrong, Rainy River, Ignace, Sioux Lookout, Longlac–Nakina and Dryden–Lac Seul areas. For these areas, this report integrates the field studies, laboratory studies and regional resource estimates, and provides a guide for the users of the detailed Open File Reports in terms of the methodology, objectives and results of the major aspects of the inventory.

Two other regional reports, for northeastern Ontario and southeastern Ontario, have also been published by the Ontario Geological Survey.

V.G. Milne

Director

Ontario Geological Survey

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CONVERSION FACTORS FOR MEASUREMENTS IN ONTARIO GEOLOGICAL SURVEY PUBLICATIONS

Conversion from SI to Imperial			Conversion from Imperial to SI		
SI Unit	*Multiplied by*	*Gives*	*Imperial Unit*	*Multiplied by*	*Gives*
			LENGTH		
1 mm	0.039 37	inches	1 inch	**25.4**	mm
1 cm	0.393 70	inches	1 inch	**2.54**	cm
1 m	3.280 84	feet	1 foot	**0.304 8**	m
1 m	0.049 709 7	chains	1 chain	20.116 8	m
1 km	0.621 371	miles (statute)	1 mile (statute)	**1.609 344**	km
			AREA		
1 cm²	0.155 0	square inches	1 square inch	**6.451 6**	cm²
1 m²	10.763 9	square feet	1 square foot	**0.092 903 04**	m²
1 km²	0.386 10	square miles	1 square mile	2.589 988	km²
1 ha	2.471 054	acres	1 acre	0.404 685 6	ha
			VOLUME		
1 cm³	0.061 02	cubic inches	1 cubic inch	**16.387 064**	cm³
1 m³	35.314 7	cubic feet	1 cubic foot	0.028 316 85	m³
1 m³	1.308 0	cubic yards	1 cubic yard	0.764 555	m³
			CAPACITY		
1 L	1.759 755	pints	1 pint	0.568 261	L
1 L	0.879 877	quarts	1 quart	1.136 522	L
1 L	0.219 969	gallons	1 gallon	**4.546 090**	L
			MASS		
1 g	0.035 273 96	ounces (avdp)	1 ounce (avdp)	28.349 523	g
1 g	0.032 150 75	ounces (troy)	1 ounce (troy)	**31.103 476 8**	g
1 kg	2.204 62	pounds (avdp)	1 pound (avdp)	**0.453 592 37**	kg
1 kg	0.001 102 3	tons (short)	1 ton (short)	**907.184 74**	kg
1 t	1.102 311	tons (short)	1 ton (short)	**0.907 184 74**	t
1 kg	0.000 984 21	tons (long)	1 ton (long)	**1016.046 908 8**	kg
1 t	0.984 206 5	tons (long)	1 ton (long)	**1.016 046 908 8**	t
			CONCENTRATION		
1 g/t	0.029 166 6	ounce (troy)/ ton (short)	1 ounce (troy)/ ton (short)	34.285 714 2	g/t
1 g/t	0.583 333 33	pennyweights/ ton (short)	1 pennyweight/ ton (short)	1.714 285 7	g/t

OTHER USEFUL CONVERSION FACTORS

1 ounce (troy) per ton (short)	20.0	pennyweights per ton (short)
1 pennyweight per ton (short)	0.05	ounces (troy) per ton (short)

Note: Conversion factors which are in bold type are exact. The conversion factors have been taken from or have been derived from factors given in the Metric Practice Guide for the Canadian Mining and Metallurgical Industries, published by the Mining Association of Canada in cooperation with the Coal Association of Canada.

x

Peat and Peatland Resources of Northwestern Ontario

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Manuscript approved for publication by O.L. White, Chief, Engineering and Terrain Geology Section, March 26, 1987. Report published with the permission of V.G. Milne, Director, Ontario Geological Survey.

Abstract

The peatland resources of northwestern Ontario were investigated as part of the Peatland Inventory Project of the Ontario Geological Survey (1982–1985). Data from six study areas (Rainy River, Dryden–Lac Seul, Sioux Lookout, Ignace, Armstrong and Longlac–Nakina) are presented in a comparative manner, and are integrated here to provide a regional overview of the resource. Detailed descriptions of each of the six study areas have already been published as Open File Reports by the Ontario Geological Survey.

The methods used for the peatland inventory ranged from on-site detailed mapping and sampling to regional satellite imagery interpretation. Laboratory analyses on the physical and chemical properties of the peat were also undertaken for 650 samples.

Of the 1400 peatlands greater in size than 100 ha which were identified in the region, 145 were surveyed. This report, therefore, represents the survey of 72 600 ha of peatland containing an estimated 1 530 000 000 m^3 of *in situ* peat.

The total peatland area in the region is estimated at 700 000 ha, 43 percent of which is classified as conifer swamp. Bogs and fens, which offer a higher potential for peat exploitation, cover an estimated 260 000 ha and contain approximately 6 850 000 m^3 of peat.

Laboratory analyses indicate that 39 percent of the peat samples met the fuel-grade criteria and 32 percent represented peat with good horticultural potential.

Résumé

Les ressources en tourbière du Nord-Ouest de l'Ontario ont fait l'objet d'une étude dans le cadre du Projet d'inventaire des tourbières de la Commission Géologique de l'Ontario (1982–1985). Les données recueillies dans six secteurs d'étude (Rainy River, Dryden–Lac Seul, Sioux Lookout, Ignace, Armstrong et Longlac–Nakina) sont présentées de façon comparative et sont incorporées ici pour donner une vue régionale d'ensemble de cette ressource. Des descriptions détaillées de chacune des six études ont déjà été publiées comme des dossiers publics par la Commission Géologique de l'Ontario.

Les méthodes utilisées pour l'inventaire des tourbières vont de la cartographie détaillée et l'échantillonnage *in situ*, à l'interprétation d'image satellite régionale. Des analyses de laboratoire des propriétés physiques et chimiques de la tourbe ont également été réalisées sur 650 échantillons.

Parmi les 1400 tourbières de plus de 100 ha qui ont été identifiées dans la région, 145 ont fait l'objet d'une étude. Ainsi donc, ce rapport représente l'étude de 72 600 ha de tourbière contenant approximativement 1 530 000 000 m^3 de tourbe *in situ*.

L'étendue totale des tourbières dans la région est estimée à 700 000 ha dont 43 pour 100 sont classés comme marécage à conifères. Les tourbières et marais qui offrent un plus grand potentiel pour l'exploitation de la tourbe, couvrent environ 260 000 ha et contiennent à peu près 6 850 000 m^3 de tourbe.

Les analyses de laboratoire indiguent que 39 pour 100 des échantillons de tourbe répondent aux critères de pouvoir calorifique et 32 pour 100 correspondent à une bonne tourbe d'horticulture.

Peat and peatland resources of northwestern Ontario, by J.L. Riley and L. Michaud, Ontario Geological Survey, Miscellaneous Paper 144, 175p. ISBN 0-7729-6136-0.

1.0 Summary

The Peatland Inventory Project of the Ontario Geological Survey undertook, between 1982 and 1985, the survey of peatlands across 87 970 km² of northwestern Ontario. Peatlands are a distinctive element of the landscape of this region, and are already the focus of considerable economic activity, notably forestry.

The inventory investigated numerous aspects of the peat and peatland resources of northwestern Ontario. Methods ranged from detailed on-site coring, profiling and resource calculations, to broad-scale interpretation of satellite imagery; from detailed laboratory analysis of large numbers of peat cores, to reconnaissance studies of the types of peatland vegetation which have generated the peat deposits of the region.

1. Field surveys were conducted on 145 individual peatlands in northwestern Ontario (Figure 1). An area of 72 600 ha of peatland was covered, and the survey included 5542 individual peat cores. These field surveys assessed probable and possible resource volumes of 1 530 000 000 m³ of *in situ* peat. More than half of this volume was well-humified peat worth consideration as potential energy peat.

Of the total surveyed volume, 632 000 000 m³ were calculated from detailed isopach mapping, on 100 m by 500 m sampling grids, in deposits more than 2 m deep. A total of 25 of the 53 sites surveyed at this level of detail were sites with significant volumes of peat, in this case containing areas of greater than 2 m peat depth over more than 150 ha. Nine of these larger sites were located in the Rainy River study area. Seventy-one percent of all the peat samples analyzed (*see* below) met minimum energy standards, and the energy potential of these larger sites is substantial.

Of these 25 larger deposits, three were considered to have potential in terms of conventional horticultural peat production, based on material requirements for peat type (greater than 70 percent moss), fiber content (greater than 60 percent), peat pH (less than 4.9), and surficial peat depth (von Post H1-3 peats greater than 1 m deep) (sites 52G-165 and 52G-226 in Ignace study area, and site 52F-60 in Dryden–Lac Seul study area). However, most conventional peat producers include peat which is slightly more humified (i.e., H4) in their resource calculations. If this is done for the sites surveyed in northwestern Ontario, where the most common peat humification level is H4, the horticultural peat potential of these deposits is extremely significant, and warrants further, more intensive survey of selected deposits.

The surveyed sites were among the larger and more accessible peatlands of the region. They can be considered as representative of the 1400 peatlands larger than 100 ha in size which were identified in the region during the course of site selection.

2. For each of the six study areas in northwestern Ontario (Figure 1), field project teams produced Open File Reports already published by the Ontario Geological Survey. These reports include extensive site-specific data, mapping, and transect profiles of each surveyed peatland, with detailed text on the peat resource, the peatland vegetation, accessibility, topography and drainage, land use and tenure, and resource potential.

This summary report is intended to complement these study area reports by summarizing the methodology of the overall inventory, integrating results within a regional context, and incorporating broad-scale remote sensing survey results and detailed laboratory data with the most salient details of the field survey work.

3. In order to estimate regional peat volumes, it was necessary to generate regional estimates of the areas of various peatland types, under which predictable depths of peat could be expected, based on the detailed peat coring undertaken in the field. The remote sensing component of the program involved Landsat 2 satellite imagery, thematically interpreted in a supervised manner based on independent field checks of peatland types.

On this basis, peatlands were estimated to occupy 8.0 percent of the entire landscape of the study areas of northwestern Ontario, a total of 700 000 ha. In Rainy River study area, peatlands cover 25 percent of the landscape. An estimated 43 percent of this area was conifer swamp (300 000 ha), and 13.1 percent was thicket swamp (91 500 ha). Hardwood swamps were minimal in extent, and marshes covered 5.1 percent of the total peatland area (36 000 ha). The focus of attention was on the bog and fen systems, which predictably occurred on deeper peats (greater than 2 m). Open and treed bog covered 132 000 ha (19 percent of all peatlands), and fens were estimated to cover an additional 131 000 ha (19 percent).

Regional peat volume estimates were inferred by extrapolating measured average peat depths for each major peatland type, derived from detailed field studies.

Of a total regional volume estimate of 12 642 000 000 m³ of *in situ* peat, over half occurs as relatively shallow deposits (averaging less than 1.5 m) underlying swamps. However, an estimated 264 000 ha of peatlands are bogs and fens, which predictably have depths averaging greater than 2 m.

These bogs and fens contain a volume of about 6 850 000 000 m³, equivalent to about 1 200 000 000 tonnes of peat at 50 percent moisture content. If 50 percent of this volume were ex-

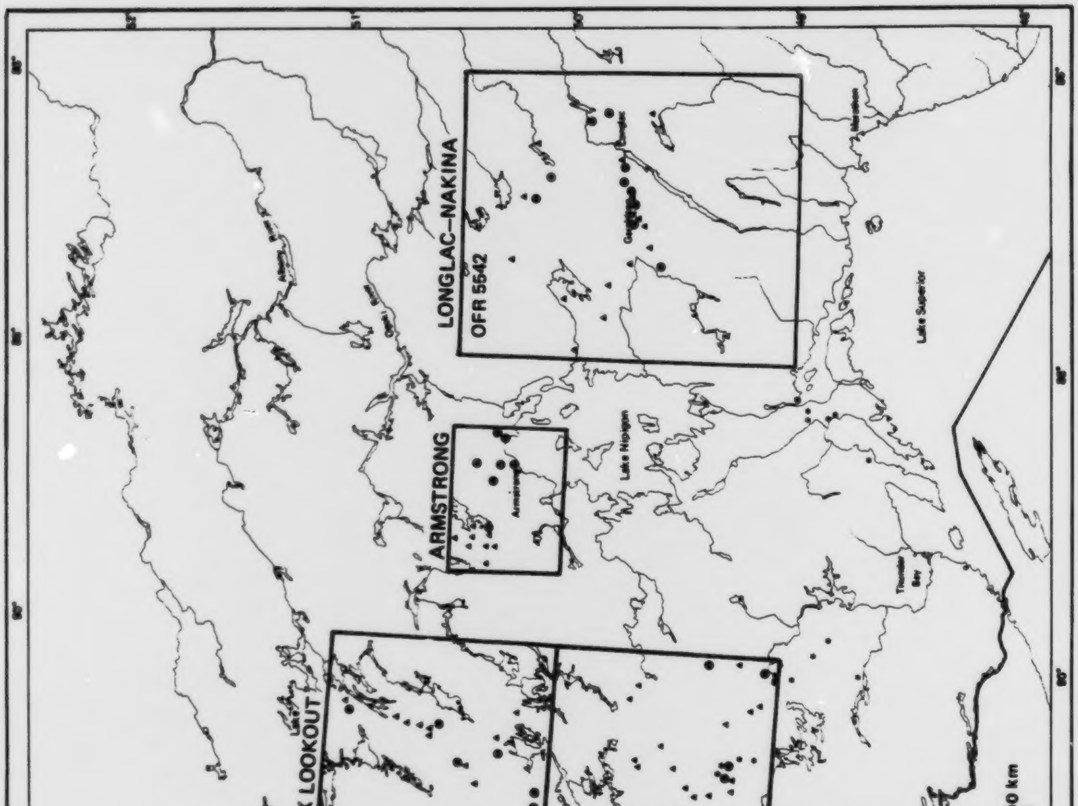

DRYDEN–LAC SEUL
OFR 5544
SIOUX LOOKOUT
OFR 5543
IGNACE
OFR 5487
ARMSTRONG
LONGLAC–NAKINA
OFR 5542
RAINY RIVER
OFR 5480
MANITOBA
Lake Nipigon
Lake Superior
Thunder Bay
Armstrong
Trout Lake
Atikokan
Fort Frances
Rainy River
● DETAILED STUDY SITE
▲ RECONNAISSANCE STUDY SITE
• PREVIOUSLY REPORTED SITE
20 0 100 km

Figure 1. *Peatland inventory study sites, northwestern Ontario.*
(OFR numbers refer to Open File Reports, Ontario Geological Survey. Sites previously studied are indicated with an asterisk, and are based on Graham (1979).)

ploitable fuel peat, the energy equivalent would be 167 000 000 tonnes of oil.

At least 50 percent of the overall total areal and volume estimates must be discounted as exploitable resources because of various factors such as the noncontinuity of many peatlands, the small size of many peatlands, poor accessibility, land use conflicts and, especially, poor drainage potential.

However, these regional estimates suggest an enormous peat resource and, as well, the scale of the potential for improving forest site conditions on marginal peatlands through drainage. The potential for the development of these peat and peatland resources, especially on a site-specific basis, requires further study of the socioeconomic costs and benefits, particularly in terms of markets and transportation.

4. From the 53 sites surveyed in detail, 650 peat samples from 131 cores were tested in terms of their physical and chemical properties. The complete data set is included in this report, as are initial analyses of results.

Poorly humified peats (von Post H1-3) with moss contents of more than 70 percent were considered to have horticultural potential. These made up 32 percent of all the samples analyzed, and had mean values, in terms of peat pH (5.0), cation exchange capacity (average 163 meq/100g), fiber content (70 percent), moss peat content (88 percent), absorptive capacity (average 20.1 x dry weight) and other parameters, which are typical of good quality horticultural-grade peats.

In many of the sites surveyed, the average thickness of poorly humified moss peat was less than 1 m. Most sites certainly achieved this minimum depth when H1-4 moss peats were considered. The addition of H4 peats in similar analyses of average characteristics reduced the quality of the peat in terms of peat pH (average 5.2) and fiber content (average 63 percent), but not significantly in terms of cation exchange capacity (average 164 meq/100g), absorptive capacity (average 17.5 x dry weight), or other parameters. Fully 51 percent of all peats analyzed were considered to be H1-4 peats with more than 70 percent moss content.

By European and American standards, energy peats in the Ontario context must exceed 4165 net calories per gram and have a low ash content, certainly lower than 25 percent. A total of 39 percent of all the peat samples analyzed met these fuel-grade criteria, and had humification levels of H4 and greater. In terms of net heating value (average 4685 cal/g), volatile matter (average 67 percent), ash content (average 7.6 percent), total carbon (average 52 percent), hydrogen (average 5.4 percent), sulphur (average 0.19 percent), and other parameters, these are good quality energy peats. A further 32 percent of the peats were assessed at lesser levels of humification (H1-2), but also met these standards.

In terms of large-scale peat production, the necessities of conventional harvesting methods dictate extremely large production fields, for example, a minimum of 1250 ha of fields for a 40 MW power plant. The inventory data include sites of this scale (especially in Rainy River, Ignace and Longlac–Nakina study areas), but further investigation of those or other sites, or groups of proximal sites, would be a prerequisite to serious consideration of large-scale energy peat developments.

5. The environmental and physiognomic characteristics of the major peatland vegetation types, and their species composition, were documented from peatlands across the region.

The proportions of peatland types are typical of most of the Precambrian Shield areas. In the Rainy River area, however, conifer swamps are less abundant while bogs and thicket swamps are unusually common. Within the regional context, this local variation reflects the particular physical setting of the Rainy River study area. Northwestern Ontario peatlands are generally distinct from those in the northeast in the prevalence of minerotrophic fens. These are especially rich in species in the Longlac–Nakina study area as a result of the highly calcareous substrates on which they have developed.

The longterm successional relationships apparent in the field studies and vegetation data suggest that, driven by the process of net peat accumulation and subject to the dynamics of site hydrology, there are general successional trends towards effectively drier (greater average depths-to-water) and more nutrient poor sites (lower surface pH). This general succession is from minerotrophic to ombrotrophic ecosystems.

The characterization of peatland vegetation summarized in this report offers a regional synopsis of dominant vegetation types as baseline data for interpretation of the potential of many of the peatlands in the region in terms of nonextractive uses.

1.1 ACKNOWLEDGMENTS

Numerous individuals were involved in these studies, and their efforts are gratefully acknowledged. In particular, the authors would like to thank some of those involved with the field studies and data reporting: E. Dawe, L. Sayn–Wittgenstein, P. Tomascik, N. Patterson, J. Kaiser, R. Holland, P. van Wyck, D. Keys, J. Gagnon, J. Bouzane, J. Radforth, E. Korpijaakko, S. Banovac, D. Smith, P. Niblett, P. Henderson, I. Spence and B. Grimard. These individuals were the principal investigators of the project teams in each study area, working for the consulting firms indicated in Section 2.5 of this report.

Supervised classification of Landsat imagery was done by S. Pala, A. Boissonneau, A. Jano, N.

Goba, W. Woitowich, D. White, J. Narraway, and the senior author at the Ontario Centre for Remote Sensing.

Laboratory analyses were carried out by Technical Service Laboratories Ltd. (Mississauga). J.A. Burgener, P. Burgener and W. Grondin are especially thanked. The Ontario Geological Survey Geosciences Laboratories offered valuable guidance with the analytical program.

At the Ontario Geological Survey, this project was guided by P.G. Telford and O.L. White of the Engineering and Terrain Geology Section. Also in this Section, and deserving special thanks for their work on the Inventory, were J. Stevenson, W. Woitowich, G. Fernandez, A. Bleiwas and S. Dunlop.

2.0 Introduction and Review of Project

This report summarizes the 1982–1985 Peatland Inventory Project of northwestern Ontario, its objectives, methods and results. The majority of detailed site-specific information has been published as Open File Reports of the Ontario Geological Survey during the course of the Inventory. This report complements those detailed reports by focussing on the broader regional results of the Inventory, and on the integration of the field studies with remote sensing and laboratory studies which paralleled the field studies.

The Peatland Inventory Project was initiated by the Ontario Geological Survey in 1981, as part of the Hydrocarbon Energy Resources Program (HERP) that was funded over a five-year period (1981–86) following the 1979 Ontario Government decision to investigate means of increasing the Provincial level of energy self-sufficiency (Telford 1983).

The first step in the peat studies of HERP was educational. The Ontario Ministry of Natural Resources, the Ministry of Energy and the Ministry of Northern Affairs jointly commissioned Monenco Ontario Ltd. to carry out a review of the peat industry, to undertake a preliminary estimate of the Province's peat resources, and to recommend Provincial initiatives in this field (Monenco Ontario Ltd. 1981). Release of this publication coincided with the International Symposium on Peat—An Awakening Natural Resource, held in Thunder Bay in 1981, cosponsored by the Ontario Government and the Canadian National Committee of the International Peat Society (Tibbetts and Telford 1981).

Monenco estimated that Ontario's peatlands cover approximately 26 million hectares. The estimated 9.9 million hectares of peatland situated south of the southern limit of discontinuous permafrost correspond to approximately 42 billion tonnes of peat at 50 percent moisture content. These figures were based on available terrain studies and limited airphoto checks. Monenco's first recommendation was for a resource inventory, as a necessary prerequisite to the planned and orderly development of a Provincial peat industry.

2.1 BACKGROUND

Peat deposits in Ontario and eastern Canada have been studied at various times and by various methods over the past 70 years. The studies by Anrep (1914), Auer (1930) and Leverin (1941) were broad in scope, dealing with horticultural and fuel peat resources. More recently, studies of Ontario deposits were undertaken by the Ontario Geological Survey and the Canada Department of Energy, Mines and Resources (Graham and Tibbetts 1961, 1964; Graham 1973; Graham and Associates Ltd. 1977), culminating in a review of *Some Peat Moss and Peat Deposits in Selected Areas* of northern Ontario (Graham 1979). Other provinces and jurisdictions have also undertaken peatland inventories: New Brunswick (Keys et al. 1981; Keys 1983); Newfoundland (Pollett 1968; Wells and Pollett 1983); Nova Scotia (A. Anderson, Nova Scotia Department of Mines and Energy, Halifax, personal communication); Quebec (P. Buteau, Service de la Geologie du Quebec, Ministere de l'Energie et des Ressources, Quebec, personal communication); Manitoba (Mills 1983); New York (Carlson and Sweatt–Monenco Inc. 1982); Minnesota (Minnesota Department of Natural Resources 1981); Maine (Cameron et al. 1984); Massachusetts (Brenninkmeyer and Russo 1984); and others. The National Research Council of Canada and the International Peat Society (IPS, Proceedings of 5-year Congresses; Bulletin; Peat Abstracts; and SUO: Unioninkatu 40B, SF-00170 Helsinki 17, Finland) have also published numerous reports and proceedings relating to peat resource inventories and inventory methodologies.

With this broad background of inventory methodologies available, a decision was made to conduct the inventory within the following general guidelines.

1. Proceed on the basis of specific geographic study areas, chosen to reflect areas with high densities of peatlands, and in which interest was expressed in an inventory being conducted. The 16 study areas ranged in size from 3500 km^2 to 24 000 km^2, with an average area of 13 250 km^2.
2. Within each study area, a number of the larger, more accessible and less tree-covered sites were designated for detailed surveys. The number of detailed survey sites within the study areas varied from 6 to 17, with an average of 10 detailed study sites in each survey area.
3. A number of other sites were identified as reconnaissance survey sites, to be studied in less detail, with the intention of recommending further study or not. The number of reconnaissance survey sites in the study areas varied from 8 to 33, with an average of 16.
4. The site-specific field studies were augmented by Landsat 2 image interpretation of the entire study areas, with the resultant images (1:50 000) classified thematically with peatland type units similar to those used in the detailed field studies. Field studies intended to groundtruth the remote sensing work were conducted in each study area by the senior author and the Ontario Centre for Remote Sensing (OCRS). The OCRS subsequently produced regional imagery and areal measurements of specific peatland types. This data was then integrated with

the detailed field study results, to produce regional estimates of different types of peatlands, and regional peat volume estimates.

5. The detailed and reconnaissance field studies were undertaken by private sector consulting firms or groups of firms, one in each study area. The field study teams were encouraged to include experienced peat surveyors and field botanists, in order to allow an interchange of expertise and, in the case of peat surveyors, the transfer of peat surveying skills to Ontario consulting firms lacking previous experience in the field.
6. Standardization of the field studies was achieved through the use of very detailed specifications for all aspects of field work, data collection and assembly, and report writing, and through field visits by the senior author of this report.
7. The laboratory analysis of all peat samples was undertaken by a single laboratory that assisted in the development of a standard methodology for all analytical studies (Riley 1989a).

The standardized field studies of the Peatland Inventory Project began in 1982–83. The inventory methods were modelled on the Finnish and New Brunswick peat resource evaluation systems (Telford 1983; Korpijaakko and Woolnough 1977; Keys 1983; Keys et al. 1981). The results of these studies led to recommendations as to possible changes to the methodology of the inventory (Riley 1983), resulting in the methodology which was applied during the field seasons of 1983–84 and 1984–85. These studies were considered to be at a level of detail appropriate to a baseline inventory of this scale, thus providing a well-documented framework for more detailed future resource appraisals.

2.2 OBJECTIVES

The objectives of the inventory were as follows:

1. to carry out reconnaissance field investigations of designated peatlands, in order to assess or confirm which sites should be surveyed in detail
2. to carry out detailed field investigations of designated peatlands; to evaluate the peat type and peat humification stratigraphy, peat volumes, elevations, drainage, surficial vegetation, and other relevant information
3. to subdivide and map all designated peatlands on the basis of airphoto interpretation and field work into major types, i.e., bog, fen, swamp, marsh and open water; and to further subdivide these units into physiognomic groups

The objectives must be viewed in the context of the level of detail implied by the methods. Previous authors have concurred on a general ranking of assessment methods (Monenco Ontario Ltd. 1981; Tibbetts 1983), modified below.

Level 1 Peat and peatland resources estimated on the basis of remote sensing or airphoto techniques, topographical maps, and relevant literature sources (e.g., Monenco Ontario Ltd. 1981).

Level 2 Resources estimated on basis of remote sensing or airphoto techniques, topographical maps, relevant literature sources, aerial reconnaissance, and reconnaissance field work at a restricted number of representative points on a site, in this case, in the order of 1 sample point per 50 to 80 ha of peatland (reconnaissance survey sites).

Level 3 Peatland and peat resources measured and evaluated over the entire peatland by generally recognized sampling and analytical techniques, in this case, in the order of 1 sample point per 6 to 10 ha, with 1 to 3 physical cores removed for laboratory testing. Sampling and data collection are defined by grid placements at ca. 500 m intervals, with sampling at 100 m intervals on grid transects. This spacing of the grid network also defines the resolution of elevation, isopach or profile mapping undertaken (detailed survey sites).

Level 4 Site-specific measurements of peatland and peat resources prior to and designated for potential economic exploitation, undertaken at a scale suitable to the necessary resource, drainage, harvesting and reclamation needs of a particular production plan.

The Ontario Peatland Inventory Project incorporated regional remote sensing surveys at Level 1 detail, reconnaissance surveys of some sites at Level 2 detail, and detailed surveys of selected peatlands at Level 3 detail.

The level of detail selected for this resource survey combined detailed measurement of the peat resources in selected peatlands with the capability of inferring or indicating the resource potential of other nearby peatlands. This combination of Levels 1 to 3 resource assessments required the integration of ground surveys, remote sensing and laboratory analyses in order to provide both site-specific detail and regional overview to planners and prospective developers.

Methods of mineral resource estimation in Ontario (Robertson 1975; APEO 1976) suggest that the peat resources which can be estimated by the above levels of investigation are as indicated below. Because of the peculiarities of peat and peatland resources, the following potentialities are the case only where an additional number of specific material and deposit characteristics are available.

Level 1: Speculative Resources

Level 2: Possible (or Inferred) Reserves; Sub-Marginal Conditional Resources

Level 3: Probable (or Indicated) Reserves; Possible Reserves or Sub-Marginal Conditional Resources

Level 4: Proven Reserves

None of the studies undertaken by the inventory has approached the Level 4 of detail. It is worth noting that several peat specialists (for example, Tibbetts 1983) recommend that the term "reserve" not be applied to any peat resource figures until economic assessments are completed, thereby better reflecting the fact that the economics of the Canadian peat industry, especially in terms of energy potential, are poorly defined.

2.3 POTENTIAL USES OF PEAT AND PEATLANDS

The actual and potential uses of peatlands and peat deposits are highly diverse. A brief introduction to these uses may assist in the interpretation of the inventory results in terms of various potentials.

Peat may be considered simply as the accumulating mass of dead vegetation in a situation in which decomposition is prevented or slowed by the presence of a high water table. However, peat as a material is not at all simple. There exists in Ontario a remarkable array of different peatland vegetation types, each of which has different gross physical and chemical characteristics which contribute continuously to a similarly variable organic or peat substrate. The peatland vegetation and the accumulating peat also reflect the variability of the geomorphological terrain in which the peatland occurs, the specific hydrology of the site, and the manner in which inorganic nutrients are introduced into the peatland ecosystem.

The physical and chemical processes which take place during accumulation are complex. The process of decomposition includes diminution of organic particle size, stratification, compaction and, perhaps, restricted percolation or dispersion of particles within the peat profile. Processes of chemical humification include degradation of plant cellulose, hemicellulose, lignins, tannins, etc., into partially degraded artifacts of those precursors, as well as into carbohydrates, enzymes, humic and fulvic acids, other acids and carbon dioxide, all interactive to some degree with inorganic materials present.

These processes also vary in relation to the type of precursor materials, the site's hydrology, the site-specific aerobic/anaerobic regime, the acidity of the peat and peat waters, the seasonal patterns of oxidation, reduction and water level position, and the climate prevalent in a particular area. In addition to these complex abiotic chemical processes, the uptake and the products of algae, fungi, bacteria, and other microfauna and flora are important biochemical elements of these systems. In this regard, our laboratory studies are an attempt at baseline characterization of the gross physical and chemical characteristics of Ontario's peat materials, in relation to the types of peatlands in which they have formed.

2.3.1 ENERGY

The energy uses of peat are of strategic long term importance in terms of energy self-sufficiency, whether for domestic, industrial or community uses. In Finland, Ireland, the USSR and elsewhere, the fuel peat industries have become highly mechanized, and strategically important to those countries' energy budgets and social policies.

Dry harvesting of peat (milled and sod) for direct combustion for heat or electrical generation is the norm for the industry. However, considerable research has been undertaken through the former Peat Program of the National Research Council of Canada on wet harvesting techniques more adaptable to northern climates, and on wet oxidation and biogasification processes.

On the basis of United States Department of Energy criteria and Finnish industry standards, fuel grade peats are considered in the Ontario context to be peats with more than 4165 cal/g net calorific value, and with less than 15 percent ash content, both on a dry basis. Other fuel peat characteristics, such as shipped peat bulk densities and moisture contents, vary with the harvesting and combustion methods.

Some of the harvesting factors and peat deposit characteristics critical to large-scale energy production are considered in the section "Categorization of Deposits for Potential Peat Use" (Section 3.4, Methods).

(For further references, *see* Harme 1982; Suoninen 1982; Institute of Gas Technology 1980; Berggren et al. 1980; Monenco Ontario Ltd. 1981, 1983; ADI Ltd. 1982; CNC-IPS 1983; Monenco Consultants Ltd. 1985; Mundale 1981; Ontario Bureau of Mines 1892, 1893; Kalmari 1982; Lang 1984.)

2.3.2 HORTICULTURE

The Canadian peat industry is at present almost exclusively a horticultural peat industry. Canadian production is worth over $75 000 000, with over 75 percent of the product exported to the United States of America (USA). Exports to the USA account for 99 percent of USA imports, and are valued at $68 000 000 (1983). Exports are equivalent to more than 50 percent of reported total USA domestic production (Davis 1983).

The USA imports Canadian peat at premium values because of the high sphagnum content of the Canadian export product. In the USA, the principle uses for sphagnum peat moss are for general soil improvement, ingredients for potting mixes, nursery use and mushroom beds. In addition, the USA has a large domestic market for sedge peat, which is currently serviced by domestic production.

Ontario production of horticultural peat is declining, and was reported as about 1 percent of Canadian production in 1984. More than 80 percent of Ontario's consumption comes from New Brunswick, Quebec and Manitoba, yet an estimated 70 to 80 percent of Canadian peat exported to the USA from eastern Canada is shipped through southern Ontario. In Ontario, production figures are poorly documented because, for the domestic market especially, very few of the small bulk material producers report production figures to Statistics Canada.

There are no labelling regulations for baled peat in the USA or Canada, but there are general expectations vis-a-vis the quality of export-grade sphagnum peat moss. These expectations are not dissimilar from the standards required by the soil-less potting mix business in southern Ontario. Because many characteristics of the peat material are modified significantly from their field condition through the breaking of fibers during harrowing, windrowing and harvesting, only some of the characteristics of high quality horticultural peats can be interpreted from the laboratory tests undertaken by the inventory: e.g., pH(H_2O) less than 4.9; peat type greater than 70 percent sphagnum moss; humification 1-3 on the von Post scale; cation exchange capacity 85 to 160 meq/100g; and ash content less than 5 percent. These standards do not apply where suitable markets for other peat types are found, whether for bulk or baled materials.

(For further references, *see* Weatherson 1985; Sheppard et al. 1982; Boodley 1982; Graham 1979; Carlson 1983; Grandmaison 1982; Brown 1982; Puustjarvi and Robertson 1975; Puustjarvi 1979; Farnham 1968; ASTM 1981; Riley 1989a; Gunther 1983; Carncross 1981.)

2.3.3 AGRICULTURE

Agricultural production on organic soils, under controlled water table conditions, is extensive in southern Ontario. Although most notable at the Bradford–Holland Marsh, and on shoreline peatlands of southwestern Ontario, agricultural drainage has been viewed as the most significant process in the conversion of natural wetlands and peatlands in southern Ontario as a whole (Champagne 1981).

Agricultural production on organic soils is highly significant, with hay and pasturage the principal uses in northern Ontario, and with vegetable crops such as onions, carrots, lettuce, celery, potatoes, and other "muck" crops dominant in southern Ontario. Production of sod on organic soils is increasingly prevalent, and the cultivation of cranberries is seen to have considerable potential (Smith 1980). Canadian agricultural commodity production on organic soils is estimated to have a market value of over $70 000 000 (Levesque 1982).

Current research by various agencies is focussed on marketing, water table control and subsidence reduction, and fertilization regimes (Lucas et al. 1975; Adamson 1975; Valmari 1982; Newland 1980; Lucas 1982; Valk 1980, 1982; M. Valk, Senior Muck Crops Specialist, Muck Research Station, Horticultural Research Institute of Ontario, Kettleby, personal communication; Levesque et al. 1980).

2.3.4 FORESTRY

In southern Ontario, the logging of hardwood and conifer swamp peatlands is commonplace, but of limited overall economic significance. However, in the central latitudes of the province, where forestry is most active, peatland forestry is of critical economic importance. In this region, it is estimated that production black spruce forest on peatland accounts for 38 percent of all peatlands. In the Clay Belt of Ontario, the majority of wood harvested is from peatlands, mainly black spruce swamps (Jeglum et al. 1982). Site classification, harvesting systems and impacts, site preparation and regeneration, and the integration of harvesting and regeneration activities are the focus of intensive, ongoing research.

Unforested peatlands were the focus of the Peatland Inventory Project in the north and, where possible, in the south. These poorly treed areas are not the traditional domain of peatland forestry in Ontario. In Fennoscandia, however, peatlands which are less productive from the point of view of forestry (e.g., less heavily treed bogs and fens), are commonly drained in situations where the economic benefits of improved tree growth are greater than the costs of drain-construction, fertilization, intermediate or regeneration cuttings, and/or afforestation. In Finland, it was estimated that 23 percent of the entire forested land base in 1982 was drained peatland forest (Heikurainen 1982a).

Peatland drainage trials have occurred at different times in Ontario's Clay Belt and, in 1984–85, a feasibility trial on an area of 410 ha (110 km of drains) was initiated just east of Cochrane, with the objective of demonstrating how a drainage system is established on an operational level. Concurrent fertilization and regeneration trials are also underway (Rosen 1984; Koivisto 1985).

(For further references, *see* Stanek 1976; Stanek and Jeglum 1977; Jeglum 1985; Jones et al. 1983; Laine and Starr 1979; Heikurainen 1982a, 1982b; Pavainen 1985; Pavainen and Wells 1977; Payandeh 1982; Ketcheson and Jeglum 1972.)

2.3.5 OTHER USES OF PEAT

In addition to horticultural and energy uses, a great diversity of other uses are made of peat. For example, the cation exchange capacities of some peat materials make them particularly suitable for sewage treatment and runoff filtration (Toth 1980; Guntenspergen et al. 1980; Sloey et al. 1978; Nichols 1980; Thun et al. 1983; Loxham and Burghardt 1983; van der Valk et al. 1978), for mine tailing leachate treatment (Eger et al. 1980), and for mine waste site amelioration (Campbell 1984).

The production from peat of low-sulphur, highly *conductive metallurgical* coke is important in Germany and Finland for electric-arc ovens used in the manufacture of iron alloys (Ekman 1982; Grumpelt 1983; Fuchsman 1980; Andre Marsan et Associes Inc. 1980). Associated with this is the production of barbecue charcoal and activated carbon (Sipila et al. 1983; Fuchsman 1980; Andre Marsan et Associes Inc. 1980; Ekman 1982).

Biochemical applications of peat include the production of waxes (Fuchsman 1980); synthetic fuels (Punwani et al. 1983; Andre Marsan et Associes Inc. 1980; Punwani and Lau 1981; Ekman 1982); culturing of high-protein yeasts (Fuchsman 1980); and other chemical processes (Luttig 1983; Fuchsman 1980; Forsberg et al. 1984).

Other, more traditional uses include floral peat for wreaths, etc.; peat pots, pellets and blocks for commercial nursery use (Chistyakov et al. 1983); and mushroom-growing and earthworm culture substrates. Applications which are highly developed in Europe, but almost unknown in North America, include balneological therapies (for rheumatic and gynaecological disorders especially), and the use of peat in cosmetics, peat packs, baths, ointments and soaps (Solovyeva and Lotosh 1984; Strecker and Gyarmati 1980).

2.3.6 ENVIRONMENTAL IMPACTS OF PEATLAND DEVELOPMENTS

The conversion of natural peatlands to resource extraction purposes has obvious impacts on the wildlife habitats of developed peatlands (IEC Beak Consultants 1983). Particular attention has been focussed on the effects of peatland drainage developments on the quantity and quality of discharged waters, and on modified drainage patterns (Ertugrul and Sober 1980; Siegel 1979; Martin 1980; Schwintzer 1979; Jeglum 1975; Clausen et al. 1980; Predmore and Brooks 1980; Washburn and Gillis Assoc. Ltd. 1983b). The dry harvesting of peat also impacts on air quality and worker comfort by creating dust (Ertugrul and Sober 1979, 1980; Conklin 1978; Riihimaki et al. 1980).

Combustion of peat results in the emission of various materials (Hasanen 1982; Ketola et al. 1983; Ertugrul and Sober 1979; Monenco Ltd. 1983). Liquefaction, gasification or wet oxidation entails significant aqueous discharges (Predmore and Brooks 1980; Ontario Research Foundation 1984; Monenco Ltd. 1983; Washburn and Gillis Assoc. Ltd. 1983a).

Other environmental impacts vary considerably from area to area, and vary with the use of the peat or the type of peatland (Lofton 1980; Walters et al. 1980; Osbourne 1982; Clarke–Whistler et al. 1984; Washburn and Gillis Assoc. Ltd. 1982; Monenco Ontario Ltd. 1981; Carpenter and Farmer 1981; Clarke–Whistler and Rowsell 1982; Williams Bros. Engineering Co. 1979; Clausen 1979).

The effects of forest drainage have been studied most notably in Finland (Heikurainen 1982a). General water quality monitoring has been undertaken in Minnesota on peatland systems comparable to those of northern Ontario (Minnesota Department of Natural Resources 1985). Impact assessments as part of highway construction procedures have been developed in the United States (Smith 1984).

2.3.7 MITIGATION OF EFFECTS AND SITE RECLAMATION

In peat harvesting situations, the use of settling ponds for buffering the effects of peat water discharge is widespread, and even regulated in some jurisdictions (Selin et al. 1984). Most combustion plants recycle flue gases to aid in dewatering peat, and studies have been made of further recycling of these potential emissions (Ketola et al. 1983).

Reclamation of mined sites entails a close appraisal of the costs and benefits in terms of the particular hydrological balance which must be struck for particular land uses. Elevated water levels may be conductive to reclamation for marsh creation, cranberry or wild rice production, waterfowl or fish habitat, or lake construction. Reduced or maintained water levels may be more suitable to end uses such as semi-natural peatland (common practice in Germany and the Netherlands), pasturage, tree or coppice-growth crops, or other uses (Farnham 1979; Ellington and Knighton 1984; Farnham et al. 1980; Osborne 1982; Carpenter and Farmer 1981; Ferda and Novak 1976; Martin 1980; Washburn and Gillis Assoc. Ltd. 1983a).

2.3.8 CONSERVATION OF PEATLANDS

The conservation of peatlands and wetlands, especially in areas where these habitats historically have been impacted by development pressures, has become the focus of considerable research and management attention: for example, in Ontario (Riley 1989b; Bardecki and Patterson 1989; Shay 1981; Champagne 1981; Ontario Ministry of Natural Resources and Environment Canada 1984; Ontario Ministry of Natural Resources 1984; Van Patter and Hilts 1985; Houser 1974; Federation of Ontario Naturalists 1979); in Canada (Clarke–Whistler and Rowsell 1982; IEC Beak Consultants Ltd. 1983); in the United States (Tiner 1984; Worley 1984; Minnesota Department of Natural Resources 1981); and in Finland (Havu 1982; Ruuhijarvi 1982; Kuitunen and Kuitunen 1985).

Germany has a strong peatland preservation program (Kuntze and Eggelsmann 1981; Schmatzler 1981; Falkenberg 1982), which includes research on such matters as reclamation/regeneration (Dietze 1981; Nick 1984) and hydrological buffer zones (van der Molen 1981).

Considerable discussion has been made of the rationale and the economics of peatland-wetland preservation (Bardecki 1984; Thibodeau and Ostro 1981; Odum 1978). Peatlands often support diverse and unusual wildlife assemblages (Hummel 1981; Shaw and Fredine 1956; Golet 1978), and can be considered to have particular educational, aesthetic, heritage and recreational values independent of their development potential (Riley 1989b; Kreutzwiser 1981). The hydrological value of peatlands, and their necessary integration into watershed and land use planning is often cited as a critical value in site conservation (Bertulli 1981; Carter et al. 1978; Gosselink and Turner 1978; Ontario Chapter, Soil Conservation Society of America 1981a, 1981b).

Many peatland-wetland values are the subject of detailed scientific studies, and this scientific interest is often cited as a reason for selective peatland preservation. As well as providing habitat for numerous rare plants and animals, peatlands are hydrologically partitioned into a great diversity of vegetation types (Jeglum et al. 1974) which entail a parallel partitioning of wildlife niches (e.g., Niemi et al. 1983). Peatlands have been the object of numerous biomass productivity studies (Reader 1978; Richardson 1978), which have implications in terms of organic carbon storage and atmospheric carbon uptake (Boville et al. 1982). Some peatland systems may play a specific scientific role through their recognition as useful monitoring stations for accumulative records of atmospheric deposition of heavy metal and organochemical fallout (Glooschenko et al. 1981; Glooschenko 1986; Gooschenko and de Benedetti 1983), pollen deposition, and macrofossil assemblages.

2.3.9 GEOTECHNICAL ASPECTS OF PEAT AND PEATLANDS

The geotechnical aspects of peat and peatlands include all aspects of organic terrains and substrates which are of concern to the engineer, such as the trafficability of all-terrain vehicles, or the loading performance and hydraulic conductivity (and permeability) of particular peat types intended as the foundation or the environs of roadways, buildings, drains, and pipelines (MacFarlane 1969; Burwash and Wiesner 1984; Hobbs 1986).

In resolving design and construction problems, the engineer draws on diverse relevant information sources. Some material parameters, such as peat depths, bulk densities, etc., can be derived from the Inventory data base for particular sites, but more exacting engineering data is required for almost any type of actual peatland development.

These additional data may include airphoto interpretation of peatland patterning, hydrology and permafrost characteristics (Mollard and Janes 1984); the seasonal characteristics of potential winter or off-road access routes; *in situ* peat density studies (Lefebvre et al. 1984; Grigal 1983); hydrological discharge and carrying characteristics (e.g., Bertulli 1981); permeability studies on road bed materials and culvert placements for mitigating drainage or damming effects (Rycroft et al. 1975); ditching plans and surface water interception by perimeter ditches; load settlement and consolidation studies (Raymond et al. 1972; Hollingshead and Raymond 1972), and road construction directly on peat substrates (Rowe et al. 1984; Hanrahan and Rogers 1981; Gruen and Lovell 1984; Keyser and Laforte 1984a, 1984b).

2.3.10 GEOCHEMISTRY OF PEAT AND PEATLANDS

The occurrence and distribution of major and minor elements within a peatland is subject to both stratigraphic and areal variability. In terms of the latter, both peat and water chemistry offer critical monitoring and interpretive capabilities in terms of substrate fertility, current site productivity (Stanek and Jeglum 1977), and ecological classification (Jeglum et al. 1974; Pakarinen 1978; Schwintzer 1978, 1981; Schwintzer and Tomberlin 1982; Vitt and Slack 1975; Vitt and Bayley 1984).

The distribution and movement of elements within peat profiles, and the biochemical partitioning of elements within a profile have been studied in detail as a means of understanding the successional, accumulative and decompositional processes operating within a peatland (Largin et al. 1972; Damman 1978; Levesque et al. 1982; Levesque and Millette 1977; Urquhart and Gore 1973; Szilagyi 1973; Pakarinen et al. 1980; Hemond 1980; Kilham 1982; Pakarinen and Gorham 1983). An important aspect of these studies has become the use of ombrotrophic peat bogs as monitoring sites for the study of surface peat uptake of atmospherically deposited materials, many of which are anthropogenic (Gorham 1961; Gorham and Tilton 1978; Oldfield et al. 1981; Pakarinen et al. 1980; Glooschenko and Capobianco 1982).

Direct application of geochemical studies has been made to geochemical prospecting in organic terrains (Salmi 1967; Boyle 1977; DiLabio and Coker 1982).

2.3.11 CROWN LAND DISPOSITION AND REGULATORY CONTROLS

Regulations for the disposition of Crown Lands for peat development, and for regulatory control of environmental impacts are in place in Ontario (Stocking 1981), as they are in other jurisdictions in Canada (J. Phillip Nicholson Inc. 1984); in New Brunswick (Keys et al. 1981); in Minnesota (Asmussen 1983; Johnson 1983; Minnesota Department of Natural Resources 1984); and in Finland (Havu 1982).

In Ontario, peat-related Crown Land disposition is controlled by the Mining Act as administered by the Mining Lands Section of the Ministry of Northern Development and Mines, and the Public Lands Act as administered by the Lands Management Branch of the Ministry of Natural Resources.

2.4 STUDY AREAS IN NORTHWESTERN ONTARIO

Six areas in northwestern Ontario were studied during the Inventory Project (Figure 1). They are all located between 48°30′ and 51°N latitude, and between 86° and 95°W longitude (Table 1).

During the Inventory Project, 145 individual peatlands were studied, which had a total peatland area of 78 850 ha (0.9 percent of the total area of the study areas) (Table 2). These peatlands were the most accessible large sites identified for study on the basis of available topographic mapping, aerial photographs and satellite imagery, and were considered generally representative of the type of large, relatively unforested peatlands occurring throughout northwestern Ontario.

2.5 PROJECT PARTICIPANTS IN PEATLAND INVENTORY IN NORTHWESTERN ONTARIO

2.5.1 DETAILED FIELD STUDIES (*see* Table 3)

2.5.2 REMOTE SENSING STUDIES

In 1982, the Ontario Centre for Remote Sensing was commissioned by the OGS to study the application of computer-assisted Landsat image interpretation to peatlands in the vicinity of the Groundhog River, northeast of Timmins (Pala and Boissonneau 1985). This test project refined remote sensing techniques which were subsequently applied to the other study areas, in order to provide the regional context of the overall distribution of different peatland types in northwestern Ontario.

2.5.3 LABORATORY STUDIES

Technical Service Laboratories Ltd. (Mississauga) conducted the laboratory analysis of peat samples collected at detailed survey sites in northwestern Ontario using standardized analytical methods (Riley 1989a).

TABLE 1. NORTHWESTERN ONTARIO STUDY AREAS.

Year	Study Area	1:250 000 NTS Mapsheet	Total Study Area
1982-83	Armstrong	Part of 52I	3 470 km^2
1983-84	Rainy River	Parts of 52C, 52D	4 600 km^2
	Ignace	52G	16 000 km^2
1984-85	Sioux Lookout	52J	16 000 km^2
	Longlac-Nakina	42E, 42L (S 1/2)	24 000 km^2
	Dryden-Lac Seul	52K, 52F (N 1/2)	24 000 km^2
Totals 1982-85			87 970 km^2

TABLE 2. INVENTORY COVERAGE IN NORTHWESTERN ONTARIO.

Study Areas	No. of Peatlands Surveyed	Total Peatland Area of Sites Studied	Percentage of Total Study Area
Rainy River	29	29 993 ha	6.5%
Dryden-Lac Seul	25	7 403 ha	0.3%
Sioux Lookout	23	3 954 ha	0.3%
Ignace	28	24 540 ha	1.5%
Armstrong	14	3 910 ha	1.1%
Longlac-Nakina	26	9 104 ha	0.4%
Totals	145	78 849 ha	0.9%

TABLE 3. FIELD STUDY PARTICIPANTS, NORTHWESTERN ONTARIO.

Study Area	Consultant	Ontario Geological Survey Open File Report	Year of Report Release
Rainy River	Northland Assoc. Ltd., St. John's	OFR 5489	1984
Dryden-LacSeul	Monenco Ontario Ltd., Toronto	OFR 5544	1986
Sioux Lookout	Phantom Exploration Services Ltd., Thunder Bay	OFR 5543	1986
Ignace	Proctor and Redfern Group Ltd., Toronto	OFR 5487	1984
Armstrong	Trow Ltd., Toronto	(unpublished)	-
Longlac-Nakina	Dendron Resource Surveys Ltd., Ottawa	OFR 5542	1986

(Note: Full citations are included in References, Section 9.0.)

3.0 General Inventory Methodology

3.1 FIELD SURVEYS

The Peatland Inventory study areas (Figure 1) were selected to include areas of considerable peat resources, within which there was expressed interest in an inventory being conducted or which displayed significant resource potential. The individual peatland sites to be surveyed were selected on the basis of available peat information, relevant topographic and terrain mapping, preliminary airphoto interpretation, Landsat 2 feature imagery (1:50 000) and discussions with Ministry of Natural Resources staff with program responsibilities for the study areas. Selection was also based on considerations of accessibility, and the scale and type of peatland. In terms of the latter, larger and less forested sites were preferred, in order to satisfy the objective of evaluating as much as possible of the peat and peatland resources of each study area. Selected sites were delineated by straight line perimeter boundaries along UTM 1000 m grid lines.

All peatlands more than about 100 ha in size, and all survey sites, were plotted on 1:250 000 NTS base maps of the study areas. On these index maps (Appendix D, back pocket), each peatland was assigned a number. The complete peatland index number consists of the map number of the 1:250 000 NTS map sheet on which the site occurs, followed by a site number of up to three digits; e.g., 43J-823 or 42P-8. In order to avoid confusion which may have arisen using geographic or colloquial names for peatlands, this numerical index was used throughout the inventory for referring to particular peatlands.

The project teams commissioned to undertake the field studies were provided with a detailed manual describing the required field studies and report writing (Riley 1984b). In addition, the project teams were requested to review a number of reports and papers discussing peat inventory methods and peatland uses (e.g., Morgan and Pollet 1983; Radforth and Brawner 1977; Graham 1979; Institute of Gas Technology 1980; Jeglum and Boissonneau 1977; Rees 1982; Sheppard et al. 1982; Tibbetts and Telford 1981; Riley 1983, 1984a), and available publications of the International Peat Society and the Canadian National Committee of the International Peat Society.

The project teams undertook a preliminary interpretation of airphotos (1:15 840, or 1:10 000 where available) before field studies in order to plan and allocate sampling effort. Field studies were intended to clarify and modify this photo interpretation, and the final peatland classification maps integrated both field data and airphoto interpretation. This integration was done most successfully where various project team members, especially the airphoto interpreter and the field botanist, co-operated in completing the mapping in the field, following detailed field studies. For each designated survey site, airphotos were interpreted and a final peatland classification map (1:10 000) was completed, with all peatlands delineated and subdivided into peatland types and physiognomic groups, using the terminology and classification units adopted by the Inventory Project (Appendix C; Jeglum et al. 1974; Jeglum and Boissonneau 1977).

The collection of data on site was standardized through the use of standard "site data record" forms completed at each sampling point on the peatland (Appendix C). These were used on both detailed and reconnaissance survey sites, and the difference between the detailed and reconnaissance surveys was principally in the density of sampling effort.

The detailed surveys of sites concentrated on the collection of data at sampling points distributed on a grid system of transects across the site. A baseline transect was usually surveyed on the long axis of the peatland, and sideline transects were surveyed at right angles, customized for each site in order to best distribute coverage across the peatland. In many instances, secondary baseline-sideline series were required in order to conform with the configuration of a site. At 100 m intervals along these transects, points were surveyed and sampled. In areas not sufficiently covered by the grid, extra traverse points were sampled between transects.

Each sample point was identified in the following manner. Baselines were designated as 'B' (or 'F'), and points along it were identified by their distance (in metres) and direction; e.g., B000W, B100W, etc. Sidelines were designated as 'L' (or 'G'), and points along it were identified by the point at which the sideline intersects the baseline, and by distance and direction along the sideline. For example, L700N + 1250E was the point on the sideline which intersects the baseline at B700N, and which was 1250 m east of the baseline. Additional traverse points off the transects were numbered consecutively; e.g., T1, T2, etc.

On detailed survey sites, sampling density was 1 sampling point per 8 to 10 ha on sites greater than 1000 ha, and 1 sampling point per 6 to 8 ha on smaller sites. Where extensive areas of shallow peat (less than 1 m) were encountered, especially in combination with dense tree cover, sampling lines were often discontinued.

On reconnaissance survey sites, the sampling density was in the order of 1 sampling point per 50 to 80 ha of peatland. On these sites, representative sampling points were cored at a minimum of 2 points for each peatland vegetation type covering more than 20 percent of the site, with the addition of other points of interest. Points were aligned, where possible, as a rough transect so that stratigraphic data could be presented in profile form. These reconnaissance sampling points were identified by consecutive numbers; e.g., R1, R2, etc.

The standard "site data record" forms (Appendix C) were completed for all sampling points on detailed and reconnaissance survey sites. For each point these records included: peatland index number; point location on the sampling grid; date; investigator; latitude/longitude of site; UTM grid reference of the site; surface wetness at sampling point, hummock-hollow microtopography; average depth-to-water; number of snags or stumps hit in ten probes to 2 m depth around each sampling point; the type of basal sediment underlying the peat; elevation of sampling point to the nearest 0.3 m (by various methods including transit work, electronic topochains, airborne laser profiling and photogrammetry); total peat depth; total depth of humified peat (von Post scale 4^+); and total depth of unhumified peat (von Post scale 1-3). For the purposes of these studies, peat with a von Post humification of 1-3 was considered unhumified (and of horticultural interest primarily), and $H4^+$ peat was considered humified (and of more interest in terms of energy potential).

At each sampling point, the type of peatland vegetation was recorded (Appendix C; formation, subformation, physiognomic group, disturbance modifiers, and dominance type), as was the Radforth cover type (Keys 1983); the average tree canopy height; the percentage cover (light interception method) by tree canopy height; the percentage cover (light interception method) by tree species greater than 150 cm, shrub species greater than 150 cm, shrub and tree species less than 150 cm, graminoid/herbaceous species, and moss/lichen species; and the plot sizes used for cover calculations.

At each sampling point, the peat stratigraphy was recorded by recovering a full core with a Mini-Macaulay sampler (5 cm diameter, 50 cm long, NRCC 1979) or a Hiller sampler (3 cm diameter, MacFarlane 1969). Core was pulled from alternate holes to minimize contamination or mixing of the sample by the auger tip.

The recovered core was divided into intervals based on changes in peat type and von Post humification (Henderson and Doiron 1982). The major peat types encountered were sphagnum moss (Ss), other mosses (Sb), sedge-herb peat (C), woody peat from shrubs (Ln) and woody peat from trees (Ll), with minor amounts of *Eriophorum* (ER), *Equisetum* (EQ), and others (MS). For each interval, the estimated composition was recorded on a percentage basis; e.g., Ln1C2Ss7 indicated a peat type composed of 70 percent sphagnum, 20 percent sedge-herb and 10 percent shrub. Any seeds, charcoal layers or constituents at less than 10 percent (less than 1) were also recorded. This rough characterization of the plant remains was relatively easy in poorly decomposed, especially surficial, peats, but becomes more difficult with increased decomposition, especially above H5 on the von Post scale. Where moss or wood peats of questionable provenance were encountered, 'S' and 'L' were recorded instead of Ss/Sb or Ln/Ll.

Ooze and marl intervals were also recorded. The term "ooze" (oz) was used to describe subaquatic humus deposits, such as gyttja, dy, muck, sapropel, copropel, etc., as defined by Stanek (1977). Such sediments vary in composition and sedimentation regime, but tend to have a relatively high ash content. They tend to be amorphous and/or gel-like. The "gyttja" type was often white-green-grey-brown in colour, gel-like or with a loose coprogenic or granular structure. The "dy" type was usually a brown-black gel and, more often than gyttja, appeared to be transitional to a very well humified peat. Seeds of aquatic plants were often present.

"Marl" was used to described the greyish or white, loose deposits of impure calcium carbonate, largely precipitated through evaporative effects or the action of aquatic organisms. Both ooze and marl were usually encountered in a basal position, but also occurred higher in the sequence. Marl in southern Ontario was occasionally found as periodic laminations throughout a profile.

The von Post humification rating is based on a scale of 1-10, and is the most widely used rapid field technique for the characterization of this aspect of peat. The determination entails examination of three features; colour and amount of water released in a gentle preliminary squeeze of a small hand sample, the amount of recognizable plant fiber remains, and the final squeeze test.

Preliminary laboratory analyses on Ontario peats indicated that H4 peats had suitably high calorific values to qualify them as fuel-grade peats, while still retaining many of the fiber characteristics of horticultural peats. For the purposes of many of the summary tables and conclusions, H4 peats were considered in this inventory to be potential fuel peats, and the volume calculations are based on this assumption. In New Brunswick, H4 peats are considered by many field workers to have horticultural peat potential. The Ontario Inventory results should be intepreted with this in mind.

All core intervals showing any change in peat type or humification level were measured in terms of top and bottom depths, and logged in terms of peat type and humification. In addition, a categorization of sample wetness was made, as was the estimation of the amount of fiber in the sample. The latter categorization included: 0, amorphous/sapric, without discernible fiber or recognizable plant remains; 1, sapric, little discernible fiber, large plant remains may occur, fiber tends to disintegrate under pressure, 10 to 40 percent fiber; 2, hemic, fiber and plant remains distinct, and with distinctive structure present, 40 to 70 percent fiber; and 3, fibric, breaking of hand sample entails tearing of fibers, structure is elastic, resilient, plant remains clearly recognizable, greater than 70 percent fiber.

Data from the site record forms constituted the baseline information on which subsequent mapping, discussion, profiling and evaluation was based. However, additional data on site vegetation was collected in order to complement these data, to assist in accurate airphoto interpretation, and to provide more detailed habitat descriptions for land use planning. This entailed semiquantitative collection of phytosociological data at representative peat sampling points; i.e., at three points per physiognomic group covering more than 20 percent of the peatland, and with single sample points for smaller physiognomic groups. In addition, full vegetation sampling was undertaken at all points from which peat cores were recovered for laboratory analysis (*see* Section 3.5). The more complete vegetation data were also useful in accurately characterizing the mapping units used on the peatland classification map for the site, and in contributing to text on site drainage, hydrology, succession and potential overburden removal or trafficability problems.

The full vegetation sampling entailed a record of all plant species occurring within a prescribed distance of the sampling point (in most cases, a 5 m radius), and the percentage cover (light interception) by each species within defined physiognomic strata; i.e., tree species greater than 150 cm, shrub species greater than 150 cm, shrub/tree species less than 150 cm, graminoid/herbaceous species, and moss/lichen species (refer to Appendix C for more detail). Moss and lichen species were recorded, at a minimum, where their percentage cover values exceeded about 5 percent, although some project teams exceeded or failed this minimum depending on their particular capabilities. All vascular plant species were recorded within a 5 m radius; cover values were assigned on the basis of visual estimates of light interception by each species in standard sized quadrats, usually 2 m^2 by 1 m^2, qualified by a visual estimate of the species' cover in the 5 m radius as well. The presence of water and debris was also recorded.

Plant species were identified in the field or collected for later determination by the field botanist or by experts in particular groups, e.g., mosses were sent to specialists of the National Museum of Natural Sciences (Ottawa) and elsewhere. Nomenclature followed standard treatments for Ontario; these are referenced in each Open File Report on study areas.

Full vegetation sampling included measurement of the actual depth-to-water in the hummock and in the hollow phase of the microtopography near a particular sampling point. These data allow a more accurate estimate of average depth-to-water, e.g., if the depth-to-water in the hummock phase was 55 cm and in the hollow phase was -10 cm, and if the hummock phase occupies 40 percent of the microtopography, then the average depth-to-water was calculated as $[(40 \times 55)+(60 \times -10)]/100 = 16$ cm.

Surface water pH (to nearest 0.1 units) was measured in the field on water samples retrieved from about 10 to 15 cm below the water table, or water squeezed from peat in a hand-dug pit. pH was measured with a portable pH meter and/or with composite pH papers with overlapping accuracy ranges (E. Merck ColorpHast papers in the pH 4-7 and 6.5-10 ranges, for example).

At representative points on peatlands investigated in detail, complete cores were recovered from the surface of the peat down to the underlying mineral substrate. These sampling points were selected to represent the variation in peat stratigraphy and/or vegetation occurring on the peatland. Mini-Macaulay samplers were recommended for this work (5 cm diameter, 50 cm long), and a modified piston sampler (4 cm diameter, Korpijaakko 1981) was also used.

The cores were divided into sample intervals on the basis of changes in botanical composition and degree of humification (von Post scale) (Henderson and Doiron 1982). The minimum sample weight of each core interval collected was 1 kg and detailed core logs were recorded at each sampling point. Sedimentary peats (ooze) and marl intervals were also sampled by the same procedure.

Samples of each core interval were sealed in plastic bags with excess air expelled. These samples were double bagged, sealed to prevent water loss, and clearly labelled on the outside by study area (e.g., Ignace), peatland number (e.g., 52G-191), sample point number (e.g., L3200N+200E), and stratum level (e.g., C2). The samples from all intervals of a particular core were then bagged together with another outside label including study area, peatland number and sampling point number. They were stored in the dark.

Physical samples were frozen as soon as possible in the field or kept at temperatures less than 3°C (Jasieniuk and Johnson 1982; Levesque et al. 1980). All samples were frozen when they were brought from the field study areas.

Field studies were usually conducted in July, August and September, with some extending later in the season.

3.2 OPEN FILE REPORTS ON FIELD SURVEYS

Open File Reports written by the project teams for each study area had a standard format, with the exception of the first year of the Inventory (Hearst, Pembroke, Peterborough, Armstrong study areas). This format included the following: a summary report (abstract, introduction, methodology, results and conclusions); followed by appendix reports on each detailed survey site (location, access, topography, drainage, peatland vegetation, peat depth, peat type, peat humification, peat volumes, site potential, isopach map, elevation map, peatland classification map, and peat type/peat humification profiles); and each reconnaissance survey site (abbreviated text on the same topics, with a peatland classification map and peat profiles) (Riley 1984b).

All peatland mapping was on a scale of 1:10 000, produced on base maps derived from Forest Resource Inventory (FRI) maps or Ontario Basic Maps (OBM) at available scales. The base maps included the survey site boundaries (usually along UTM 1000 m grid lines) with both latitude/longitude and UTM grid co-ordinates, and roads, trails, drainage directions on streams, grid layout and sampling points. On this base were plotted the isopach maps, elevation maps and peatland classification maps, using standardized legends (Figure 2).

The isopach map indicates the depth contours of the peat deposit at 1 m intervals. At each point, the total peat depth (m) and the depth (m) of unhumified peat (von Post scale 1-3) were indicated, as were the weighted average von Post humifications of each of these depth intervals. This map is the basis for calculations of peat deposit volumes and the assessment of particular concentrations of suitable peat. Humification inversions involving 50 cm of peat or more (e.g., 60 cm of H3 peat occurring as a stratum below a significant depth of H4 peat) were considered in calculations as part of the overall depth of that humification category (e.g., 60 cm of H3 peat was added to surficial depth of H1-3 peat).

Peat volumes in areas greater than 1 m deep were calculated by the "donut" method: 1) the surface area (ha) between each isopach contour line was measured; 2) the average total peat depth within each contour "donut" was calculated from all sampling points within the "donut"; 3) the area was multiplied by the calculated average depth to produce a volume of peat (m^3) for each contour area; and 4) the volumes of each contour "donut" were summed to obtain a volume estimate for the peat deposit greater than 1 m deep. For the area less than 1 m deep, an estimated average depth of 0.5 m, or a value estimated by the project team based on available data, was assumed in order to allow an estimate of the volume of peat in these shallower areas. The volume of well-humified peat (von Post H4$^+$) was calculated by the same procedure, but using the depth figures and averages for H4-10 peats only. Volume calculations excluded marl and ooze intervals.

The elevation map indicates surface elevations on the peatland and the upland areas immediately adjacent to the peatland. The area contoured beyond the peatland itself varied, but with the objective of providing sufficient detail to assess the overall topography of the basin and the sectors at which water drained into and out of the peatland. On-site contouring was done to 0.5 m or 1.0 m contours depending on the site, with 3.0 m contour intervals for adjacent upland areas. The former data derived from transit work, electronic topochains, airborne laser profiling or photogrammetry, and the elevation of adjacent uplands areas were based on photogrammetry or airborne laser profiling. Benchmark or reference height locations and elevations (and their sources) were indicated on the maps or in the text of the Open File Reports.

The peatland classification map indicates the distribution and occurrence of vegetation on the peatland, with the legend units based on a hierarchical classification including vegetation formations (e.g., bog, fen, swamp, marsh, poor fen), subformations (open, treed), and physiognomic (or structural) groups (e.g., graminoid, dwarf shrub, low shrub, tall shrub, deciduous, conifer, thicket, etc.) (Figure 2biii; Appendix C). The airphoto interpretation on which this mapping was based was, for the most part, done in conjunction with field studies by the photo interpreter, in co-operation with the project field botanist, and after study of the site data records compiled by sampling crews at each point. Despite a standardized classification system, the style and expertise demonstrated in this portion of the Inventory varied between study areas, and the data included in this summary report do not always coincide with data presented in the Open File Reports for each study area. The mapping also indicates the sampling points at which full vegetation sampling was undertaken by the project team. Where data were available, numerical superscripts were applied to the physiognomic mapping units, e.g., $T^{22}ls^{42}B$ indicated a bog with tree cover of 22 percent and a dominant understorey of low shrubs at 42 percent cover. The sampling density on detailed survey sites enabled the production of the above three maps, but only peatland classification maps were produced for reconnaissance survey sites.

Peat profiles indicate the stratigraphy of peat types and humification levels along the sampling transects (Figure 2biv). The top of the profile relates to surface elevation and the bottom to substrate depth and type. Peat profiles are useful interpretative illustrations and can be used in conjunction with the laboratory data presented in this report to extrapolate peat characteristics laterally within a deposit. They can provide a rough measure of the succession of peatlands through time on the site. In addition, they are an excellent guide for focussing subsequent detailed surveys for site preparation, ditching, palynological studies, etc.

The detailed peat core data is illustrated in a profile of a transect by joining strata of relative similarity of peat type or humification. There is interpretation involved in deciding on "significant" breaks in a profile. In this inventory, a "significant" break in the peat type of individual cores was viewed as a

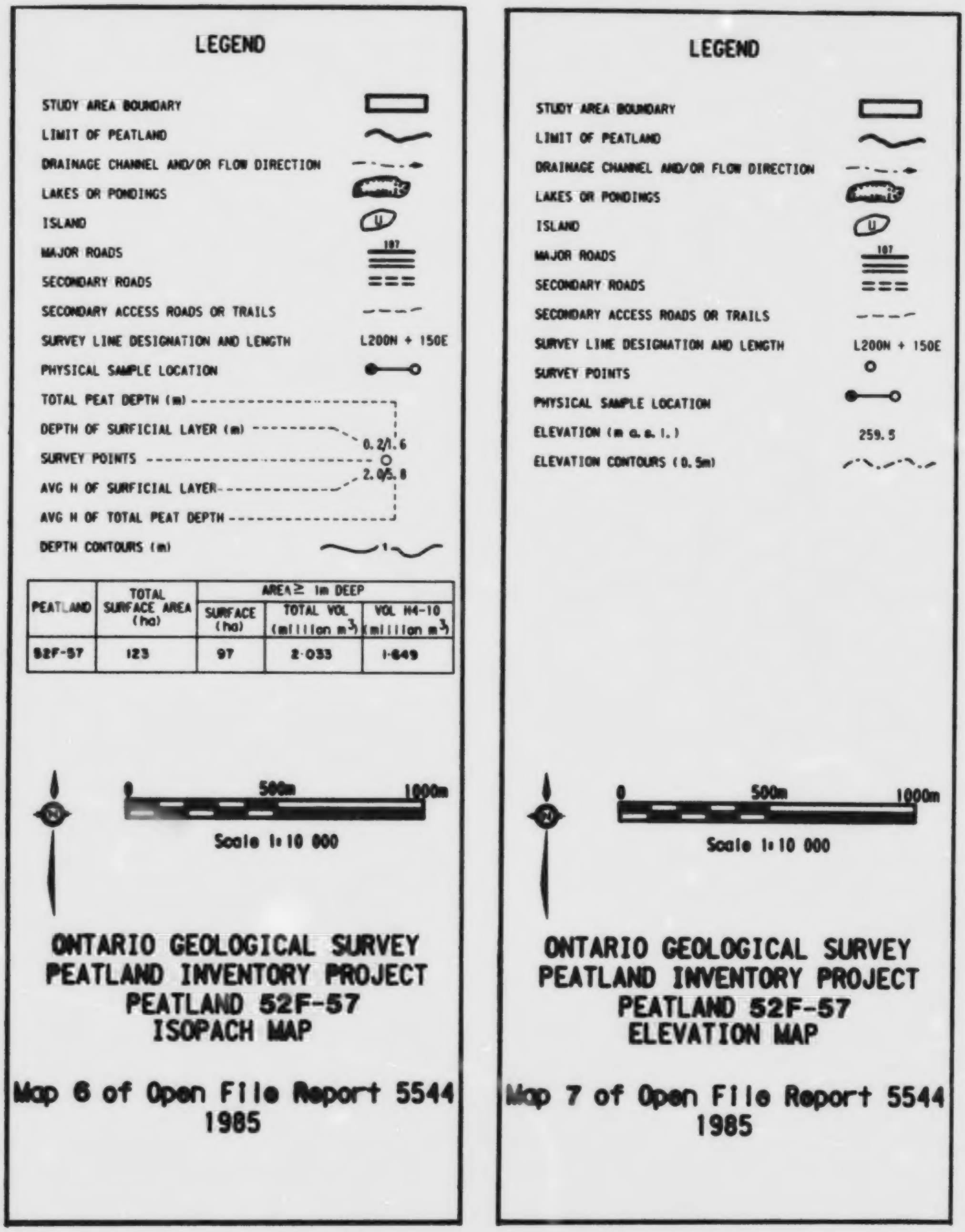

LEGEND
STUDY AREA BOUNDARY
LIMIT OF PEATLAND
DRAINAGE CHANNEL AND/OR FLOW DIRECTION
LAKES OR PONDINGS
ISLAND
MAJOR ROADS
107
SECONDARY ROADS
SECONDARY ACCESS ROADS OR TRAILS
SURVEY LINE DESIGNATION AND LENGTH
L200N + 150E
PHYSICAL SAMPLE LOCATION
TOTAL PEAT DEPTH (m)
DEPTH OF SURFICIAL LAYER (m)
0.2/1.6
SURVEY POINTS
2.0/5.8
AVG H OF SURFICIAL LAYER
AVG H OF TOTAL PEAT DEPTH
DEPTH CONTOURS (m)
1
PEATLAND
TOTAL SURFACE AREA (ha)
AREA ≥ 1m DEEP
SURFACE (ha)
TOTAL VOL (million m³)
VOL H4-10 (million m³)
52F-57
123
97
2.033
1.649
0
500m
1000m
Scale 1:10 000
ONTARIO GEOLOGICAL SURVEY
PEATLAND INVENTORY PROJECT
PEATLAND 52F-57
ISOPACH MAP
Map 6 of Open File Report 5544
1985
LEGEND
STUDY AREA BOUNDARY
LIMIT OF PEATLAND
DRAINAGE CHANNEL AND/OR FLOW DIRECTION
LAKES OR PONDINGS
ISLAND
MAJOR ROADS
107
SECONDARY ROADS
SECONDARY ACCESS ROADS OR TRAILS
SURVEY LINE DESIGNATION AND LENGTH
L200N + 150E
SURVEY POINTS
PHYSICAL SAMPLE LOCATION
ELEVATION (m a.s.l.)
259.5
ELEVATION CONTOURS (0.5m)
0
500m
1000m
Scale 1:10 000
ONTARIO GEOLOGICAL SURVEY
PEATLAND INVENTORY PROJECT
PEATLAND 52F-57
ELEVATION MAP
Map 7 of Open File Report 5544
1985

Figure 2a. *Legends for peatland inventory maps and profiles: i) isopach map; ii) elevation map.*

change of 20 percent or more in dominant peat type (e.g., C3 to C5), a change in dominant peat type (e.g., L1C4S5 to L1S4C5), or the appearance of different minor components (e.g., L). Where similar breaks between similar types occur on adjacent peat cores, this was interpreted as a discrete profile stratum.

Within this stratum, independent of its length, the peat types or humification values of all intervals recorded on the site record forms were averaged to produce a stratum-specific description; e.g., C4S6, to indicate a peat composed of ca. 40 percent sedge-herb and 60 percent moss. Peat lenses of 30 cm or less in thickness were profiled only if they extended more than 100 m.

For reconnaissance study sites, sampling density was much less. Where sampling points were arranged in a more or less straight line, a modified

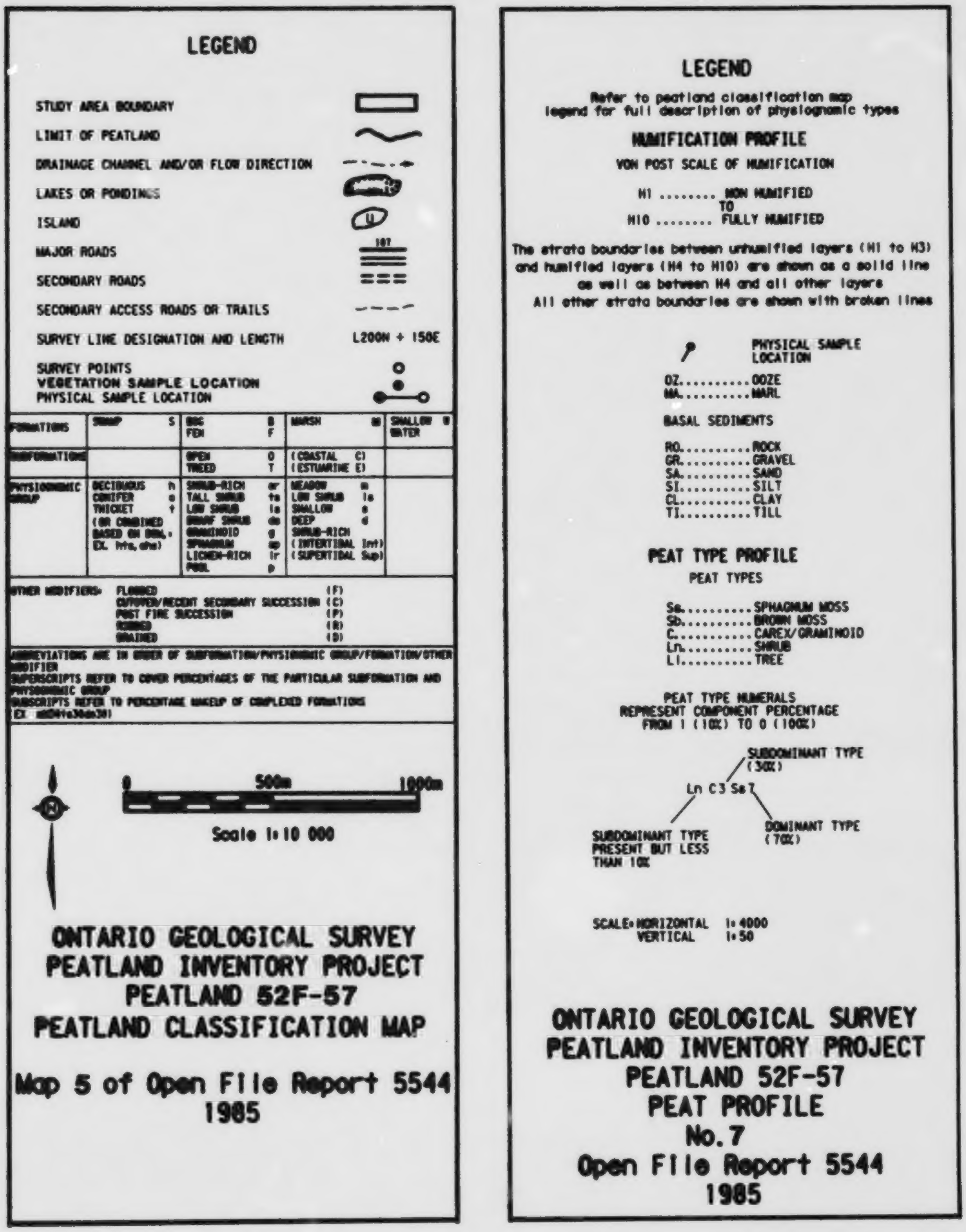

LEGEND
STUDY AREA BOUNDARY
LIMIT OF PEATLAND
DRAINAGE CHANNEL AND/OR FLOW DIRECTION
LAKES OR PONDINGS
ISLAND
MAJOR ROADS
107
SECONDARY ROADS
SECONDARY ACCESS ROADS OR TRAILS
SURVEY LINE DESIGNATION AND LENGTH
L200N + 150E
SURVEY POINTS
VEGETATION SAMPLE LOCATION
PHYSICAL SAMPLE LOCATION
FORMATIONS
SWAMP S
BOG B
FEN F
MARSH M
SHALLOW W
WATER
SUBFORMATIONS
OPEN O
TREED T
(COASTAL C)
(ESTUARINE E)
PHYSIOGNOMIC GROUP
DECIDUOUS h
CONIFER c
THICKET t
(OR COMBINED BASED ON DOM., EX. hts, chs)
SHRUB-RICH sr
TALL SHRUB ts
LOW SHRUB ls
DWARF SHRUB ds
GRAMINOID g
SPHAGNUM sp
LICHEN-RICH lr
POOL p
MEADOW m
LOW SHRUB ls
SHALLOW s
DEEP d
SHRUB-RICH
(INTERTIDAL Int)
(SUPERTIDAL Sup)
OTHER MODIFIERS:
FLOODED (F)
CUTOVER/RECENT SECONDARY SUCCESSION (C)
POST FIRE SUCCESSION (P)
ROADED (R)
DRAINED (D)
ABBREVIATIONS ARE IN ORDER OF SUBFORMATION/PHYSIOGNOMIC GROUP/FORMATION/OTHER MODIFIER
SUPERSCRIPTS REFER TO COVER PERCENTAGES OF THE PARTICULAR SUBFORMATION AND PHYSIOGNOMIC GROUP
SUBSCRIPTS REFER TO PERCENTAGE MAKEUP OF COMPLEXED FORMATIONS
(EX. mB04Ts36ds30)
0
500m
1000m
N
Scale 1:10 000
ONTARIO GEOLOGICAL SURVEY
PEATLAND INVENTORY PROJECT
PEATLAND 52F-57
PEATLAND CLASSIFICATION MAP
Map 5 of Open File Report 5544
1985
LEGEND
Refer to peatland classification map legend for full description of physiognomic types
HUMIFICATION PROFILE
VON POST SCALE OF HUMIFICATION
H1 .... NON HUMIFIED
TO
H10 .... FULLY HUMIFIED
The strata boundaries between unhumified layers (H1 to H3) and humified layers (H4 to H10) are shown as a solid line as well as between H4 and all other layers
All other strata boundaries are shown with broken lines
PHYSICAL SAMPLE LOCATION
OZ...........OOZE
MA...........MARL
BASAL SEDIMENTS
RO...........ROCK
GR...........GRAVEL
SA...........SAND
SI...........SILT
CL...........CLAY
TI...........TILL
PEAT TYPE PROFILE
PEAT TYPES
Ss...........SPHAGNUM MOSS
Sb...........BROWN MOSS
C............CAREX/GRAMINOID
Ln...........SHRUB
Li...........TREE
PEAT TYPE NUMERALS REPRESENT COMPONENT PERCENTAGE FROM 1 (10%) TO 0 (100%)
SUBDOMINANT TYPE (30%)
Ln C3 Ss7
SUBDOMINANT TYPE PRESENT BUT LESS THAN 10%
DOMINANT TYPE (70%)
SCALE: HORIZONTAL 1:4000
VERTICAL 1:50
ONTARIO GEOLOGICAL SURVEY
PEATLAND INVENTORY PROJECT
PEATLAND 52F-57
PEAT PROFILE
No.7
Open File Report 5544
1985

Figure 2b. *Legends for peatland inventory maps and profiles: iii) peatland classification; iv) peat profiles.*

peat profile was drafted. For unaligned points, the core data was plotted at the same scale as the profiles, but with no strata interpreted between points.

Detailed site evaluations included the above maps and profiles, interpretation of them, and other site-specific detail. The evaluations of individual peatlands included the location of the site; airphoto flight lines and frames; and access in terms of roads, railways, rivers, cut townships lines, rights-of-way, distances to nearby towns, industries and transportation routes. The discussion of topography and drainage integrated relevant topographic data with the elevation and isopach data on the specific site, including present and potential drainage of the site, substrate types, seasonal flooding regimes, water bodies present and any extant modifications to the natural drainage patterns. This and subsequent text focussed on the areas of the peatland which, because of peat depth, drainability and peat type, were considered to have the greatest resource potential.

The peatland's vegetation was characterized in terms of dominant formations and physiognomic groups, their distribution across the site in relation to site hydrology, and the areal coverage and average peat depth of each physiognomic group. Each peatland classification unit was discussed in relation to average depth-to-water, groundwater pH, hummock-hollow microtopography, average tree cover values, and dominant or diagnostic plant species. Detailed floristic data was summarized in tables of dominance types, and tables of the cover values of all plant species recorded at full vegetation sampling points. Any patterning of peatland vegetation (e.g., ribbing, tear-shaped islands, raised bogs, circular features) were discussed. Some aspects of this part of the Inventory were not undertaken in the first year of the inventory (i.e., Hearst, Pembroke, Peterborough, Armstrong).

Discussion of peat resource characteristics focussed on the physical aspects of the peat as observed in the field. Laboratory analyses of the peat were not available to the project teams during the field studies. As a result, peat depths, peat types and humifications, and volumes were the focus of the evaluation of the sites for peat resource development. Overall peat depths, the proportions of humified versus unhumified peat, and the average peat depths beneath certain peatland types (e.g., open bog, rather than treed bog) are critically important, especially in relation to the distribution of peat types considered most suitable for energy (C peat) or horticultural (S peat) applications.

The assessment of development potential in a strict socioeconomic sense is not feasible at the inventory stage, but an appraisal can be made based on the characteristics of all the peatlands in a study area, and of the relative suitability and accessibility of particular sites in the area. In this inventory, this entailed an appraisal of deposit volumes, generalized peat types, accessibility from present roads and population/industry centres, the degree of present tree cover on the site, the apparent drainability and trafficability of the site, and the apparent possibilities for dry or wet mining of the site (or portions of it) for energy or horticultural peat. The stump content of the deposit (after Keskitalo 1982; Keys 1983), as a measure of the volume of wood in a deposit, was also considered, as was the present land tenure, land use, and any present or past peat extraction or drainage of the site. If the site had been previously studied or if contacts with District and Regional staff of the Ministry of Natural Resources indicated knowledge of important biological values associated with the site, reference was made to those sources of information.

The reconnaissance site evaluations used a similar approach but focussed on the assessment of the suitability of sites for more detailed site investigations. This assessment was based on the potential for peat extraction on the basis of anticipated peat depths, volumes and quality, and the absence of constraints to development such as dense tree cover, drainage problems, or conflict with existing land uses, as well as proximity to population and transportation centres, and the similarity of sites to nearby detailed study sites which had apparent resource potential.

The study area assessment included a detailed summary table, containing: total peatland area; peatland area greater than 1 m deep; number of sampling points and transects; total volume of peat *in situ*; percentage stump content; peatland types, their area, average peat depth, number of peat cores, and number of full vegetation sampling points; and the numbers of physical sample cores recovered for subsequent laboratory analysis. This table provided important overall totals for peat volumes and peatland types in the portions of the study area investigated.

A table of development factors summarized certain factors in terms of whether they were limiting, good, poor or excellent in terms of development. These factors included such items as deposit area greater than 1 m deep, volumes of humified and unhumified peat, average peat depth and humifications, dominant peat type, stump content, tree cover, drainage and land tenure. This comparative table showed an overall rating of the sites as well as the regional patterns of particular development factors. The resource potential was related to other factors such as accessibility, slope gradients across deposits to potential discharge points, the occurrence of string fens (with inherent trafficability problems), and other special considerations such as Environmentally Sensitive Areas, Areas of Natural and Scientific Interest, deer yards, fish spawning areas, timber licences, and extant peat harvesting operations. Finally, the resource's potential was considered in terms of suitability for energy and/or horticultural peat use, potential draining for agriculture or forestry, and for conservation or wildlife uses where these values were pre-eminent or most suitable by default.

3.3 REGIONAL SUMMARY TABLES INTEGRATING DETAILED FIELD SURVEY AND LABORATORY RESULTS

The general methods of data analysis, mapping and reporting are outlined above as the inventory operated in the field to complement the Open File Reports on particular study areas. Those Open File Reports contain the intensive studies of numerous peatlands, but there were other aspects of the inventory which were undertaken as studies parallel to the field studies. Among these was the compilation of summary tables integrating the field studies and certain aspects of the laboratory results (Appendix A).

The overall volume of a peat deposit is of significance only by virtue of the areal extent of a suitable depth of an appropriate peat material. Approximately 90 percent of peat harvesting is by dry milled peat harvesting, so extraction for both large-scale energy and horticultural peat requires large surface areas from which very shallow, solar-dried harvests are made over sufficient lengths of time to warrant the initial capital investment. While other harvesting techniques are technically feasible, the following comments are based on dry harvesting.

The volumes and peat depth figures calculated through the field inventory are *in situ* values. During the drainage phase of a production development, a significant degree of compaction of the peat occurs, estimated at about 15 percent (Turverukki Oy Ltd. 1982). In addition, most large-scale peat operations assume that peat extraction should be discontinued within 50 cm of the basal sediment underlying the deposit, in order to avoid peat with elevated ash contents, to avoid potential damage to harvesting equipment, and to assist in site reclamation.

In some situations, this 50 cm buffer zone may be considered too little or too much, depending on the uses of the particular extracted peat and the type of underlying substrate. However, the combination of the two factors of compaction and nonextractable basal peat, means that an *in situ* peat depth of 2 m may be assumed to have an extractable depth of 1.3 m. (This figure excludes any peat removed from the surface during site preparation.)

Milled peat harvesting is by far the most prevalent production method. A thin layer of peat is milled or shredded from the top of the prepared production field, then harrowed and solar dried over the course of several days. The thickness of this harvested layer varies with circumstances, but can be assumed to be in the order of 10 to 15 mm per harvest (Suoninen 1982, reported Finnish average of 10 to 20 mm; Monenco Ontario Ltd. 1981, reported average of 12 mm).

During the potential harvesting period (May to September), the number of suitable 2- to 3-day drying periods in Ontario are 10 to 16, depending on the thickness of harvested peat to be solar dried (10 to 11 in Timmins and Armstrong, 11 to 12 in Ottawa and Fort Frances; Ecologistics Ltd. 1985). Suoninen (1982) reported a Finnish average of 16 harvests per year based on 2-day drying periods; Midwest Research Institute (1976) reported Irish average of 12 harvests per year; Monenco Ontario Ltd. (1981) reported an average of 15 harvests per year.

Therefore, at a rate of 12 mm per harvest and 15 harvests per year (a maximum value), a total of 0.18 m of peat is removed each year, so that a 1.3 m depth of peat could bear harvesting for 7 to 8 years at a minimum. This length of time would appear to be a minimum length of time in terms of the capitalization of investment in a large-scale operation.

In summary, it became apparent during the course of the inventory that the analysis of peat deposits should focus on those portions of peatlands with a minimum of 2 m of peat. This conforms with the United States Department of Energy definition of fuel-grade peats as those having a minimum depth of 5 feet, and with the Finnish and Irish estimates of usable peat resources as those being deeper than 2 m (Lappalainen 1982; Midwest Research Institute 1976).

Thus, the focus of the peat resource evaluation in this report is on the areas of peatland which have depths greater than 2 m. This entailed recalculation of all depth averages, areas and volumes, based on a reappraisal of all isopach maps and site data records produced by the project teams for each study area. This reappraisal of the data in the Open File Reports and the integration of subsequent laboratory data resulted in the production of regional summary tables included in this report (Appendix A). For detailed survey sites, these tables include:

1. study site number, and UTM grid reference
2. total area of the peatland (ha), total volume of peat *in situ* ($x10^6m^3$), volume of well-humified peat *in situ* (von Post scale $H4^+$, $x10^6m^3$)
3. area of peatland greater than 2 m deep (ha, based on planimetry of isopach maps in Open File Reports), number of sub-basins comprising that area, total volume of peat *in situ* ($x10^6m^3$) in area greater than 2 m deep, volume of well-humified peat *in situ* (von Post scale $H4^+$, $x10^6m^3$, in area greater than 2 m deep), average depth of peat in the area greater than 2 m deep (cm, based on average of all core depths in area greater than 2 m deep), and number of cores for which depths were recorded
4. average thickness of unhumified peat (cm, von Post scale 1-3, based on isopach maps) in area greater than 2 m deep
5. weighted average peat type of unhumified peat in area greater than 2 m deep (based on average of the logged cores, with the core values weighted by thickness of intervals recorded, S-C-L-Other = (% moss/10)-(% sedge-herb/10)-(% wood/10)-(% other/10))
6. weighted average humification of unhumified peat in area greater than 2 m deep (von Post scale, based on average of the logged cores, with the core values weighted by thickness of intervals recorded)
7. weighted average heat value of unhumified peat in area greater than 2 m deep (net cal/g, based on laboratory data on cores from area greater than 2 m deep, with average weighted by thickness of the intervals analyzed in the laboratory)

8. weighted average ash content of unhumified peat in area greater than 2 m deep (percent ash, based on laboratory data on cores from areas greater than 2 m deep, with average weighted by thickness of the intervals analyzed in the laboratory)
9. weighted average fiber content of unhumified peat in area greater than 2 m deep (percent fiber, based on laboratory data on cores from areas greater than 2 m deep, with average weighted by thickness of the intervals analyzed in the laboratory)
10. weighted average peat pH of unhumified peat in area greater than 2 m deep (pH, based on laboratory data on cores from areas greater than 2 m deep, with average weighted by thickness of the intervals analyzed in the laboratory)

11–17. for the well-humified peat in the area greater than 2 m deep, the average thickness, and weighted average peat type, humification, heat value, ash content, fiber content and peat pH were calculated by the same methods indicated above (4–10)

18. percentage of the peatland area greater than 2 m deep with tree cover of less than 10 percent
19. presence of a basal ooze in the area greater than 2 m deep, expressed as the average thickness (cm), the number of cores showing basal ooze, and the total number of cores in the area greater than 2 m deep
20. peatland vegetation types occurring on the whole peatland area, abbreviated as OB (open bog); TB (treed bog), OF (open fen), TF (treed fen), OPF (open poor fen), TPF (treed poor fen), cS (conifer swamp), hS (hardwood or deciduous swamp), tS (thicket swamp), mS (mixed swamp), and M (marsh), and with definitions in Appendix C
21. area of each peatland vegetation type (ha)
22. average peat depth beneath each peatland type (m), and number of cores on which average is based
23. stump content calculated for whole peatland area (%)
24. Ministry of Natural Resources Administrative District, and Site Region/Site District (Hills 1959; Hills and Pierpoint 1960)
25. comments, in this case the categorization of the peat deposits in terms of energy and horticultural peat, as discussed in the Section 3.4

The regional summary tables for reconnaissance survey sites reflect the restricted field work done and the absence of complementary laboratory data on those sites. They cover the following aspects of the peat and peatland resource:

1. study site number, and UTM grid reference
2. total area of the peatland (ha)
3. estimated average peat depth (cm), and number of peat cores on which average is based
4. estimated total peat volume *in situ* (x10^6m^3), based on multiplication of total area by average peat depth (2 and 3, above)
5. estimated volume of well-humified peat *in situ* (von Post scale H4$^+$, x10^6m^3), by multiplyng the estimated total volume by proportion of the average peat depth occupied by well-humified peat
6. average thickness of unhumified peat (cm, von Post scale H1-3), based on all logged cores
7. average humification of unhumified peat (von Post scale), based on all logged cores with H1-3 intervals; average of the logged cores, with the core values weighted by thickness of intervals logged
8. average peat type of unhumified peat (classification as indicated above), based on all cores logged with H1-3 intervals; average of the logged cores, with the core values weighted by thickness of intervals logged

9-11. average thickess, humification and peat type of well-humified peat (von Post H4$^+$; same method as indicated above for unhumified peat)

12. percentage of total peatland area with tree cover of less than 10 percent
13. presence or absence of basal ooze, based on cores logged
14. peatland vegetation types occurring on the whole peatland area, the area of each peatland type (ha), and the average peat depth beneath each peatland type, based on the cores logged (same method as indicated above for detailed study sites)
15. Ministry of Natural Resources Administrative District, and Site Region/Site District

These regional summary tables complement the study area Open File Reports in their focus on peatland areas greater than 2 m deep. However, the Open File Reports contain the results of intensive field studies not summarized in this report. They should be referred to for additional peatland information on all sites studied.

3.4 CATEGORIZATION OF PEAT DEPOSITS FOR POTENTIAL ENERGY AND HORTICULTURAL PEAT USE

Almost all of the peatlands surveyed by the inventory have potential in terms of small-scale bulk peat production for local or specialty uses where the economics warrant and where land use policies permit. However, only a restricted number of peatlands have potential for large-scale, mechanized peat harvesting operations. The following comments on potential development scenarios for large-scale developments are made in order to introduce several aspects of peat resource development which are of critical importance, and which have been adapted to a tentative categorization of peat deposits from a horticultural peat and fuel peat point of view.

In horticultural peat production, a large-scale operation is defined here as involving milled peat harvesting for a peat baling operation with an annual product of 100 000 bales (80 pounds each at 50 percent moisture content). Estimated milled peat production would be in the order of 180 t/ha/yr, assuming about 12 mm of peat per harvest and almost 15 harvests per year (*see* Section 3.3).

In comparison, Finnish production rates are estimated at 210 t/ha/yr based on 600 m^3/ha at bulk densities of 350 kg/m^3 (Suoninen 1982). Monenco Ontario Ltd. (1981) estimated potential northern Ontario production of 140 t/ha/yr, and southern Ontario production of 200 t/ha/yr. Midwest Research Institute (1976) estimated Irish annual production at 165 t/ha/yr. Turverukki Oy Ltd. (1982) estimated central Ontario production at 180 t/ha/yr.

To produce 100 000 bales per year (3636 t/yr) at production rates of 180 t/ha/yr, 20 ha are required. However, if only 1 m of harvestable horticultural peat is present, and if capital requirements demand a production duration of at least 15 years, then the area required is 50 ha. If harvestable peat depths are greater, the area required is less. If capitalization requirements demand a longer production duration, or if the number of harvests per year is reduced by weather problems, the required area of production fields may be greater.

A horticultural peat operation is used as an example above because it involves a smaller area of peatland than required for any large-scale fuel peat operation. Fuel-grade peat can be harvested at any scale dependent on the end use of the product. However, large-scale power generation requires large areas of suitable peat deposits. For example, peat power plants in Ireland vary in output from 40 to 90 MW (Lang 1984). A 40 MW plant consumes peat at a rate of about 250 kt/yr (6.3 kt/MW). Assuming a very high peat production rate of 200 t/ha/yr, this production would require 1250 ha of developed peat production fields. A 100 MW power plant, with a consumption rate of 700 kt/yr (estimated 7 kt/MW) would require a minimum of 3500 ha. In Ireland, the smallest deposit developed for milled peat harvesting for energy production is 1135 ha, with production fields of 850 ha (Midwest Research Institute 1976).

These area estimates can be considered minimum values because development of such an operation would require production of peat over an extended period of time, and the duration of production would again relate to the available thickness of suitable peat. These area requirements would rarely be met in a single deposit; a group of peatlands within an economical transport distance of a power plant is a more probable scenario. Monenco Ontario Ltd. (1981) estimated 100 km as the economic limit for transporting milled peat by rail or road. Figure 3 shows the general relationship between usable peat depths and the area of production fields, assuming a 40 MW power plant based on milled peat harvesting involving 16 harvests per year of 15 mm per harvest.

The production rates, area requirements and harvestable depths are estimates, but consideration of the relationship between these factors (and others) is critical in assessing the development potential of a site.

A tentative categorization of the peatlands examined in detail has been derived from these considerations of deposit area and usable depths. Because of the present absence of specific data on operational Canadian energy peat developments, the area requirements have been biased towards the inclusion of relatively small fuel peat deposits which may be suitable for small-scale fuel peat production. These categories have been included on the regional summary tables (Appendix A) as a ready reference to the significance of the peat resource from an extraction point of view. Other relevant comments on the significance of sites in terms of agriculture, forestry, land tenure, biological conservation, drainage, etc., have been made in the detailed text on each site in the Open File Reports on each study area.

Category A Fuel Peat Deposit

1. Peatland area >2 m deep	>150 ha
2. Average net heating value	>4165 cal/g
3. Average ash content	<15%

Category B Fuel Peat Deposit

1. Peatland area >2 m deep	50-150 ha
2. Average net heating value	>4165 cal/g
3. Average ash content	<15%

Category A Horticultural Peat Deposit

1. Peatland area >2 m deep	>150 ha
2. Average unhumified peat thickness (von Post scale 1-3)	>1 m
3. Average peat type of unhumified peat	>70% moss peat
4. Average pH of unhumified peat	<4.9
5. Average fiber content of unhumified peat	>60%

Category B Horticultural Peat Deposit

1. Peatland area >2 m deep	50-150 ha
2. Average unhumified peat thickness (von Post scale 1-3)	>1 m
3. Average peat type of unhumified peat	>70% moss peat
4. Average pH of unhumified peat	<4.9
5. Average fiber content of unhumified peat	>60%

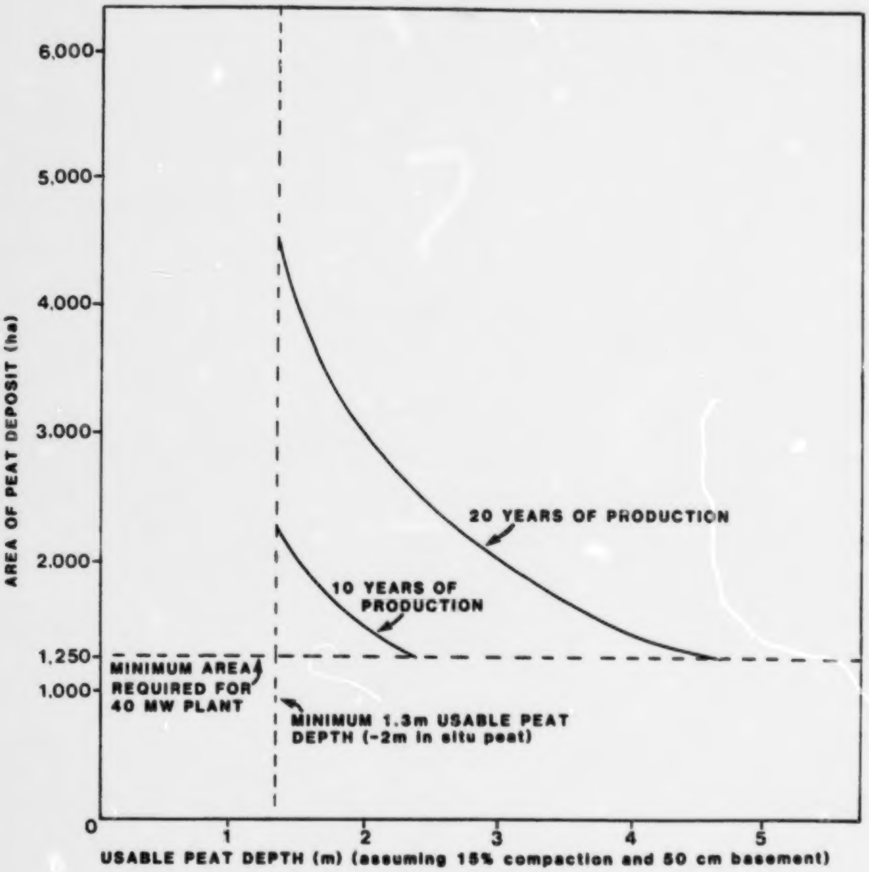


Figure 3. *General relationship between usable peat depth and area of production deposits for a 40 MW power plant operating for 10 and 20 years.*

(Moss peat is defined as having at least 75 percent moss composition (Farnham 1968). In our inventory, the botanical composition was recorded to the nearest 10 percent, therefore the value of 70 percent was adopted for moss peat. Horticultural peat is conventionally considered to be fibric, defined as having 66 percent or more of unrubbed fiber content (syringe method). This value is equivalent to 60 percent fiber content by the laboratory methods used for this inventory (Riley 1989a). Alternately, horticultural peat is considered to have H1-3 or H1-4 humifications on the von Post scale. In either case, the value of 60 percent fiber content is an accurate minimum (*see* Section 7.0).)

These categories are based directly on the peat-related data of the regional summary tables, and indirectly on the specific laboratory data on peat cores sampled (Appendix B). Modifications to these categories can be readily made with reference to these sources; i.e., if the requirement for average peat pH is less than 5.0 rather than less than 4.9. Even for the detailed survey sites, this categorization is tentative because of the limited nature of the data collected, especially laboratory data.

The percentage of the peatland area greater than 2 m deep with greater than 10 percent tree cover was not considered to be of critical importance because the significance of tree cover in terms of clearing costs will vary in relation to the value associated with the peat resource. In addition, the calculated stump content was not considered in this categorization because it was not based on a sufficient density of sampling points on the peatland area greater than 2 m deep to provide more than an approximate guide to stump content.

Within portions of peatlands greater than 2 m deep, there may be sufficient lateral variation in peat materials to warrant horticultural peat production regardless of the overall "average" values and the overall categorization of the deposit. More detailed information is in the relevant Open File Reports.

3.5 LABORATORY TESTS AND ANALYSIS OF RESULTS

From each peatland designated for detailed field survey, the project team recovered top-to-bottom sample cores. Up to four sample cores were recovered from each peatland, from points chosen after field studies to reflect the general patterns of peat stratigraphy, peat depths and peatland vegetation (*see* Section 3.1).

The laboratory tests reflect the broad objectives of the inventory, and include parameters relevant to the energy, horticultural, agricultural, forestry and ecological resources of the peatland. The testing was designed to complement the detailed site data published as Open File Reports on each study area, so that laboratory results on each core could be stratigraphically integrated with transect profiles of the peat deposits, and with other peatland data, such as peatland vegetation types. As a result, the test data is critical in documenting the resource potential of individual sites.

The laboratory methods used in the inventory project have been described in detail elsewhere (Riley 1989a). That report also describes the collection and handling of the samples, various tests of methods, results of blind duplicate and replicate tests, results from tests of standards and blanks, and the precision and accuracy achieved by the test methods. Capitalized abbreviations (e.g., CAT EX CAP) are those used as column headings in Appendix B, Physical and Chemical Properties of Peat Samples from Northwestern Ontario).

1. Cation Exchange Capacity (As-Received Peat) (CAT EX CAP)—Total amount of exchangeable cations that can be held by a peat (McKeague 1976). Horticultural peats should have a cation exchange capacity of 90 meq/100g or greater (Farnham 1968; Carlson 1983). The method used was "CEC (of Fresh Sample) by NH_4OAc at pH 7.0" (NRCC 1979), with results corrected to dry peat weight on the basis of the moisture content of sample. Sample: as-received, 25 g. Result: cation exchange capacity, meq/100g, corrected to oven-dry weight.
2. Peat pH in H_2O (H_2O pH)—The measurement of hydrogen ion concentration (NRCC 1979; Minnesota Department of Natural Resources 1982; Levesque et al. 1980; ASTM D2976-71). Sample: as-received, 20 g. Result: pH to nearest 0.1 pH unit.
3. Peat pH in $CaCl_2$ ($CaCl_2$ pH)—The measurement of hydrogen ion concentration independent of initial amounts of salts present (NRCC 1979). Sample: as-received, 20 g. Result: pH to nearest 0.1 pH unit.
4. Conductivity (COND)—An indication of the total concentration of various dissolved ions, excluding hydrogen ions (NRCC 1979). Sample: as-received, 20 g. Result: conductivity in umhos/cm at 25°C.
5. Fiber content (FIB %)—A laboratory measure relating to the degree of fiber decomposition and water-retaining capacity of the peat. Fresh peat and deionized water stirred at 240 rpm for 10 minutes, sieved through 100 mesh (0.15 mm) under wash at flow rate of 5 l/minute, carbonates dissolved, sieve residue dried and weighted (after Levesque and Dinel 1977; equations to correlate results with fiber content data by syringe method presented by Riley 1989a). Sample: as-received, 20 g. Result: fiber, percent of oven-dry peat made up of fibers greater than 0.15 mm.
6. Moisture Content (MC %)—Oven drying to determine moisture content (NRCC 1979; ASTM D2974-71). Moisture content is used in converting results of tests on as-received peat to a dry weight basis. Sample: as-received, 50 g. Result: moisture content, percent wet basis, by weight.
7. Absorptive Value (VAL ABSO)—Ratio of the weight of water originally retained in the peat *in situ* to the dry weight of the peat.
8. Absorptive Capacity (CAP ABSO)—Rate of the weight of water potentially retained in the peat following saturation in the lab, to the dry weight of the peat; decreasing with increasing humification of the peat (after Graham 1979, as "Absorptive value, dry basis"). Reported values relate to more or less undisturbed peat; harvesting methods change a peat's absorptive capacity. Sample: as-received, 50 g. Result: absorptive capacity, ratio.
9. Bulk Density (DRY BULK DENS, WET BULK DENS)—Measure of the weight of a given volume; generally increasing with increased humification and mineral content, and decreasing with increased sphagnum content (after Minnesota Department of Natural Resources 1982; Graham 1979). Bulk density can be used to convert water content, nutrient and energy characteristics measured on a unit weight basis to a unit volume basis (e.g., Lucas and Rieke 1968). Sample: as-received, 50 g. Result: bulk density, dry weight basis, g/cc; and wet weight basis, g/cc.
10. Sample Homogenization—The preparation of peat samples at 0 percent moisture content for subsequent tests was done by drying bulk samples at 50°C until most moisture was evaporated (1 to 4 weeks); grinding samples with Wiley Mill (80 mesh, 0.18 mm); finish drying at 60°C to 80°C for 16 hours. To avoid potential problems of rehydration of samples before tests, all samples were redried at 90°C to 0 percent moisture

immediately before any tests on oven-dry peat were conducted.

11. Ash Content (ASH %)—Indicates accumulaton of mineral matter as a result of decomposition and sediment load in peatland waters (after NRCC 1979; Minnesota Department of Natural Resources 1982; ASTM D2974-71; Walmsley 1977). Organic soils or sediments are considered to be peat if they contain 25 percent or less inorganic material (i.e., ash) on a dry weight basis (Andrejko et al. 1983). Sample: 1 g at 0 percent moisture content. Result; ash content, percent, dry weight.
12. Volatile Matter (VOL %)—Percentage of gaseous fraction obtained by combusting a peat sample; relates to the reactivity of peat to some processing methods. A high volatile matter content results in reduced combustion temperatures (Sheppard 1984) (ASTM D3175-77). Sample: 1 g at 0 percent moisture content. Result: volatile matter, percent, dry weight.
13. Calorific Value (NET CAL/G)—The United States Department of Energy considers peats with gross calorific values of 4400 cal/g or more as fuel-grade peat (LeMasters et al. 1983). At average levels of N (1.5 percent), S (0.18 percent), and H (5.0 percent), this value corresponds to a net calorific value of about 4165 cal/g for fuel grade peats (ASTM D2015-77). Sample: 1 g, 0 percent moisture content. Result: net calorific value, cal/g, dry weight.
14. Total Carbon (CTTL %)—Total inorganic and organic carbon (Riley 1989a). Sample: 0.05 g, 0 percent moisture content. Result: total carbon, percent, dry weight.
15. Organic Carbon (CORG %)—Organic carbon content (Riley 1989a). Sample: 0.05 g, 0 percent moisture content. Result: organic carbon, percent, dry weight.
16. Nitrogen (N %)—Nitrogen content by Kjel-Foss Automatic 16200 nitrogen determinator; method comparable to Semi Micro-Kjeldahl Method (NRCC 1979). Sample: 0.1 g, 0 percent moisture content. Result: nitrogen, percent, dry weight.
17. Hydrogen (H %)—Hydrogen content (Riley 1989a). Sample: 0.1 g, 0 percent moisture content. Result: hydrogen, percent, weight.
18. Sulphur (S %)—Sulphur content (Riley 1989a). Sample: 0.1 g, 0 percent moisture content. Result: sulphur, percent, dry weight.
19. Oxygen (O %)—By difference (=100-(Ash %+N%+H%+S%+ Total C%).
20. Arsenic (AS PPM)—Arsenic content by acid dissolution, hydride generation and atomic absorption (Riley 1989a). Sample: 1.0 g, percent moisture content. Result: arsenic, ppm, dry weight.
21. Mercury (HG PPM)—Mercury content by acid dissolution, cold vapour generation and flameless atomic absorption (Riley 1989a). Sample: 1.0 g, 0 percent moisture content. Result: mercury, ppm, dry weight.
22. Multi-Element Inductively Coupled Argon Plasma Emission Spectrometry

    1984—Calcium (CA PPM), Phosporus (P PPM), Potassium (K PPM), Aluminum (AL PPM), Iron (FE PPM), Lead (PB PPM), Manganese (MN PPM), Magnesium (MG PPM), Copper (CU PPM), Zinc (ZN PPM)—Wet-ashing dissolution (modified from Arafat and Glooschenko 1981); followed by simultaneous determination of elements by ICAP (Jarrell Ash Model 975 Atom Comp.) (Riley 1989a). Sample: 0.25 g, 0 percent moisture content. Result: the above elements, ppm, dry weight.

    1985—Calcium (CA PPM), Phosphorus (P PPM), Potassium (K PPM), Aluminum (AL PPM), Iron (FE PPM), Zinc (ZN PPM), Manganese (MN PPM), Magnesium (MG PPM), Zinc (ZN PPM)

    —Dry-ashing dissolution, followed by simultaneous determination of elements by ICAP (Jarrell Ash Model 975 Atom Comp.) (Riley 1989a). Sample: 10 g, 0 percent moisture content. Result: the above elements, ppm, dry weight.

    —Lead (PB PPM) and Copper (CU PPM)—Dry-ashing dissolution follwed by atomic absorption (Riley 1989a).

The results of the above analyses are presented in Appendix B, as are other descriptive parameters associated with individual peat sample intervals and with the sampling point location itself.

1. Depth of the Top of the Sample Interval (TOP INT CM) (in cm).
2. Depth of the Bottom of the Sample Interval (BOT INT CM) (in cm).
3. Humification (HUM 1-9)—Recorded humification of the sample interval (von Post scale).
4. Moss Peat (S)—Percentage (/10) of moss peat recorded in the sample interval; 1=10%, 2=20%. . . 0=100%.
5. Sedge Peat (C)—Percentage (/10) of graminoid-herbaceous peat recorded in the sample interval; 1=10%, 2=20%. . . 0-100%.
6. Wood Peat (L)—Percentage (/10) of woody peat recorded in the sample interval; 1=10%, 2=20%. . . 0=100%.
7. Other Peat or Material (X)—Percentage (/10) of other material recorded in the sample interval; 1=10%, 2=20%. . . 0=100%.

8. Relative Position (REL POS)—Relative position of the interval in the overall peat core:
   0 = strictly surface, living peat
   1-4 = midpoint between top and bottom of the sample interval occurs in the 1st, 2nd, 3rd, or 4th quarter of the overall core length, with the overall core length determined as the distance from the surface (or bottom of 'O' relative position) down to the bottom of lowest interval with less than 25 percent ash content, or to the bottom of the sample core
   5 = samples with 25 to 60 percent ash content, usually ooze or marl intervals
   6 = sample with greater than 60 percent ash content, usually substrate samples
9. Tree Cover at the Sampling Point (T %)—Vegetation cover at sampling point by tree species greater than 150 cm tall, as estimated percentage of intercepted light.
10. Tall Shrub or Thicket Cover at Sampling Point (TS %)—Vegetation cover at sampling point by shrub species greater than 150 cm tall, as estimated percentage of intercepted light.
11. Low Shrub Cover at Sampling Point (LS %)—Vegetation cover at sampling point by shrub or tree species less than 150 cm tall, as estimated percentage of intercept light.
12. Graminoid/Herbaceous Cover at Sampling Point (G %)—Vegetation cover at sampling point by graminoid/herbaceous/subshrub species, as estimated percentage of intercepted light.
13. Moss Cover at Sampling Point (SP %)—Vegetaton cover at sampling point by moss or lichen species, as estimated percentage of intercepted light.
14. Vegetation Formation (FOR)—Major vegetation classification type:
   1 = bog
   2 = poor fen
   3 = fen
   4 = conifer swamp
   5 = mixed swamp
   6 = thicket swamp
   7 = hardwood swamp
   8 = meadow marsh
   9 = emergent marsh
15. Substrate Type (SUB)—Recorded dominant substrate type underlying peatland:
   1 = rock
   2 = gravel
   3 = sand
   4 = silt
   5 = clay
   6 = till
16. Surficial Groundwater pH (SUR WAT PH)—pH of groundwater at sample point, sampled 10 to 15 cm below water table (*see* Section 3.1).
17. Average Depth-to-Water at Sampling Point (AV D-W CM)—Average depth-to-water tale, in cm, calculated as ((% of hummocks x depth-to-water in hummock)+(% of hollows x depth-to-water in hollows))/100.

This data set (Appendix B) was input for computerized manipulation of the data, using SPSS PC+ and PC Tables (IBM compatible). Programs used in the analysis of results were MEANS, TABLES, OPTIONS, STATISTICS, PLOT, REGRESSION, and CORRELATION (PEARSON CORR). This package was used to produce the hardcopy Appendix B; the summary peat profiles (*see* Figure 8); means, standard deviations, ranges of values for subsets of the data base (including subsets based on geographic locations, dominant peatland types, humification levels, relative positions of intervals within the cores, and combinations of these subsets); Pearson product-moment correlation coefficients between 352 pairs of variables (again with peatland type and geographic subsets); and graphs and regression equations of all variable pairs for which correlation coefficients were calculated as greater than +0.5 and less than -0.5. Some of this statistical analysis is incorporated into the discussion of results of the inventory.

3.6 REMOTE SENSING AND REGIONAL ESTIMATES OF PEATLAND AREAS AND PEAT VOLUMES

Following several initial surveys, airphoto interpretation of entire study areas was not considered a practical or rapid enough method of estimating the total extent of peatland in each study area. Few individuals could be identified as sufficiently expert at airphoto interpretation of peatland types on a large-scale production basis. In addition, the area of the Peatland Inventory Project exceeded 21 700 000 ha, with the work to be completed within three years. Finally, a relatively high level of standardization of site-typing was required between study areas to permit the final results to be integrated on a regional basis.

Given a longer period within which to complete the study, airphoto interpretation would have been an effective and accurate method. For this inventory, however, other remote sensing techniques were investigated and used.

During the late 1970s, the Ontario Centre for Remote Sensing (OCRS), Ministry of Natural Resources developed special expertise in the field of peatland/wetland mapping in the Hudson/James Bay Lowland of northern Ontario (Pala and Boissonneau 1982; Pala and Weischet 1982; Pala 1982; Riley

1982). The methods used by OCRS were based on three factors: 1) the availability of quality Landsat satellite data; 2) the availability of suitable equipment for the classification and delineation of wetland types by means of a supervised classification technique and a computer-based plotting system; and 3) the use of helicopters to carry small, multidisciplinary field teams to inaccessible field investigation sites.

In order to estimate regional volumes of peat resources from a restricted field data base, regional estimates of the distribution of peatland vegetation types were required. It is assumed that the vegetation which occurs on a peatland is a relatively conservative expression integrating all features of the peatland ecosystems (including peat depths), and that it segregates predictably in terms of community assemblages. The use of Landsat, of course, is based upon the further assumption that reflectance values recorded by the satellite relate directly to the variation in vegetation in the peatland ecosystem and to the exposure of surface water.

In 1982, OCRS was commissioned by the Ontario Geological Survey to use remote sensing techniques in an evaluation of peatlands over a 1700 km^2 study area northwest of Timmins, and to finalize a method for mapping peatlands in Ontario south of the James Bay Lowland (Pala and Boissonneau 1985). This investigation was undertaken in much greater detail than was possible for all study areas of the Peatland Inventory, but it was instrumental in defining the role of remote sensing in the overall methodology of the Peatland Inventory. The Landsat-based techniques became central to the project in terms of: 1) selecting peatlands for detailed and reconnaissance field surveys; 2) collecting regional reconnaissance data on peatlands for image classification and for familiarization with all detailed and reconnaissance survey sites; and 3) providing a data base on the distribution and frequency of peatland types across each study area as a whole, from which to derive final estimates of peatland areas in the region. The latter objective was critical to the achievement of final estimates of total peat volumes by study area and by region.

The primary data sources of this remote sensing work were the Landsat imagery, available airphoto coverage, 35 mm oblique low-level and ground photography, vegetation records, and measurements of environmental parameters in the field (i.e., site data record forms).

For most of the study areas, it was determined that Landsat imagery recorded in July or August, at about the same time of year when field studies were conducted, permitted recognition of the greatest number of peatland types. However, this was not always the case. For example, in areas with (spring-flooded) hardwood swamp, the reflectance values recorded in late summer did not allow accurate segregation of these swamps from other hardwood forests. The integration of a spring image with this late-summer image allowed swamps with above-ground spring water levels and delayed leaf appearance to be accurately delineated.

Landsat computer-compatible tapes were geometrically corrected to 1:250 000 scale NTS map sheets, with final registration to the UTM grid. The images were resampled to give a pixel coverage of 50 m by 50 m, with a maximum tolerable error of one pixel in any one direction. For study areas for which coverage was provided by two adjacent satellite passes, a computer program "merged" the frames digitally to create an accurate fit between them, after each frame had been geometrically corrected. In the event that images from two seasons were required for a single area, the digital information was merged using a computer program designed for this purpose (multitemporal imagery using image-to-image registration).

Landsat MSS bands 4, 5 and 7 were combined to create false-colour images of the data in its original state. These composites were then printed as "feature images", at scales of 1:100 000 and 1:50 000, using a computerized Applicon ink-jet plotter.

The feature images were used in conjunction with topographic maps, airphotos and comments from Regional OMNR staff, to select the sites for field study, to delineate study sites in terms of the UTM 1000 m grid, and to prepare preliminary plans of the position and orientation of field sampling grids to be used by project teams.

Helicopter-supported field studies were made of most of the study areas, with a field crew consisting of a remote sensing specialist (S. Pala or A. Jano), a wetland/geomorphology specialist (A Boissonneau), a botanist/peatlands specialist (J. Riley), and two additional crew for drilling and characterizing peat cores. The primary objectives were to evaluate the presence and variability of wetland/peatland types (*see* Appendix C, and Jeglum et al. 1974); to assess in the field the apparent spectral reflectance differences between peatland types; to decide, on the basis of the frequency of types and the spectral reflectance characteristics, which peatland/legend units were possible and most appropriate for the specific study area; and to select, delineate and document potential "training areas" (relatively large areas of homogeneous peatland vegetation) for all the peatland types which were to be classified in the study area. Although this aspect of the inventory focussed on peatlands designated for detailed field survey, "training areas" were often selected and field visits made at additional sites which usually, for reasons of inaccessibility, were not designated for detailed survey by the project teams.

Field records of this reconnaissance consisted of complete (full vegetation) site data records, additional physiognomic data records, a selective delineation of types and areas on airphotos and 1:50 000 scale Landsat imagery and topographic maps, taped oral records, peat stratigraphy record sheets and, in some cases, video-taped records.

The peatland type/legend units determined to be classifiable and which were used most frequently were the following:

Open bog: (tree cover less than 10 percent, subdivided where possible into open graminoid bog or open shrub-rich bog).

Treed bog: (tree cover 10 to 30(40) percent; usually subdivided into low-density treed bog (10 to 15 percent), medium-density treed bog (15 to 25 percent), low and medium-density treed bog (10 to 25 percent), and/or high-density treed bog (greater than 25 percent), with the latter often not segregating well from poorly stocked conifer swamp).

Open fen.

Open fen with pools: (patterned fen with very high water tables; occasionally combined in a complex with shoreline marsh which had similar spectral reflectance values).

Treed fen: (tree cover greater than 10 percent; segregated where practical into the same density classes as treed bog).

Poor fen: (segregated as treed poor fen on occasion; tree density classes not relevant in most cases because majority of poor fen had tree cover 8 to 12 percent).

Conifer swamp: (a class which was not always segregated because of difficulties in separating spectral reflectance values from dense, upland conifer stands).

Mixed swamp.

Hardwood swamp: (usually segregated into wet (spring-flooded) hardwood swamps and drier sites; occasionally combined in a complex with thicket swamp).

Thicket swamp: (seldom used except in a complex with hardwood swamp because of the small size of many natural thicket swamp areas, and because of the prevalence of thicket swamp as colonizing vegetation on logged or flooded areas).

Marsh: (occasionally combined as a complex with open fen with pools because of similar spectral reflectance values).

In most study areas, not all of these peatland types occurred over sufficiently large areas to be practically segregated at the resolution of Landsat imagery.

The supervised classification of peatland types was done independently for each study area, based on "training areas" within those study areas, two to eight such areas being established for each peatland type. For each training area for each peatland type, all the pixels were identified. For each of the pixels, the values of spectral reflectance intensity recorded on all four bands of the Landsat MSS data were aggregated to produce a "signature" bell curve for each group of training areas corresponding to a particular peatland type. The various peatland type "signatures" were statistically pared to occupy the range of possible reflectance values while avoiding detrimental overlap which might later result in the misclassification or multiple classification of pixels.

Programmed searches of the digital data files were then made to assign a peatland type class to each pixel in the study area, and the computerized Applicon plotter was used to print the colours assigned to represent individual peatland types on a hard-copy map. Manual supervision and filtering programs designed to scan for individual or small assemblages of pixels (less than 5; by "custering") were then used to remove from the image erroneous features irrelevant to the inventory, such as those resulting from anomalous spectral reflectance values associated with clear-cuts, fire burns, agriculture, urban development, etc.

Most of this manipulation was done on cathode ray tube (CRT) terminals. The final hard-copy images produced on the Applicon plotter merged the theme and feature data so that the peatland themes appeared superimposed on the original, unclassified feature imagery. The final images were produced at scales of 1:100 000 and 1:50 000, and were annotated, using mapping software, with the UTM and latitude/longitude co-ordinates, the names of geographic features, and a full legend. In addition, computer printouts were made of the area and pixel coverage of each legend unit, for the complete study area as well as for each peatland designated for detailed or reconaissance survey by project teams. These images, printouts and backup reports on field studies are maintained in the form of folios in the Engineering and Terrain Geology Section, Ontario Geological Survey.

During the generation of the classifications, checks were made of the accuracy of the designations of training areas, and of the final accuracy of the maps in relation to the sampling points actually visited during the helicopter-supported reconnaissance. An accuracy of 80 percent was considered the minimum acceptable for the points actually visited in the field.

Following the regional classification work by OCRS and the submission of detailed peatland classification work done on designated sites, a method was developed to compare the thematic Landsat results with the more detailed airphoto interpretation/vegetation analysis by the project teams.

On a site-by-site basis (all detailed and reconnaissance survey sites, using exactly the same site boundaries in terms of the UTM 1000 m grid), a comparison was first made of the Landsat coverage and the peatland classification maps to calculate the proportion of peatland either overclassified or underclassified by the Landsat image interpretation. In the case of most units, a slight underclassification had occurred, probably due to the resolution of the Landsat data and to programs which had been used to eliminate erroneously classified pixels. The underclassification was probably only slight because, within the designated UTM block, there often occurred smaller peripheral peatland areas which were not always interpreted by the project teams. Some other peatland type units, such as conifer swamp, thicket swamp and marsh, were generally very much underclassified due to the reasons indicated above on the listing of legend units. This underclassification/overclassification was quantified as an accumulative variance over all the sites, and expressed as a percentage variance for over/underclassification.

A second comparison was made, again on a site-by-site basis, of any possible misclassifications made in the supervised Landsat classification. The standard against which it was compared was the peatland classification map from the relevant Open File Report, where that map was determined to be accurate on the basis of an independent airphoto check, site data record forms and vegetation data from the project teams, and from records made during the course of helicopter-supported reconnaissance of the site. In the case of a few study areas, the project team maps were judged to lack sufficient accuracy, and a separate airphoto interpretation was done to provide the necessary standard for comparison.

In most cases, misclassification involved differences in the interpretation of tree cover densities (e.g., open bog versus treed low-density bog; conifer swamp versus treed high-density bog, treed high-density fen versus conifer swamp), and also involved difficulties in determining the extent of poor fen in some areas. Some misclassification was, of course, also due to the differences in resolution between 1:50 000 Landsat imagery and 1:10 000 peatland classification maps. The degree of misclassification was quantified as an accumulative variance over all the sites, and expressed as a percentage variance for misclassification.

The assumption was made that the variance quantified on this basis for designated survey sites also applied to the classification of peatlands elsewhere in the study area, in the same manner as specific "training area" data is extrapolated to the whole study area. On this basis, the percentage variances for over/underclassification and misclassification were applied to the areas of peatland types (Landsat theme imagery) for the study areas as a whole, as a means of improving the accuracy of the overall regional peatland cover estimates.

These data (*see* Table 6b) were considered the best available by the methods used. The only modifications made to these figures were in the cases of conifer swamp, thicket swamp and marsh. The inventory focussed on larger, more or less untreed peatlands; the peatland types mentioned above were seldom if ever the focus of much site-specific work, but usually occurred only marginally around the perimeter of sites. They were proportionally much more frequent elsewhere in the study areas. Furthermore, conifer swamp, thicket swamp and marsh were deliberately underclassified by OCRS because of spectral reflectance conflicts with other non-peatland terrain units. As a result, a separate estimate, based on the feature and theme imagery, topographic maps and some airphoto checks, was made of the probable extent of these units in the study areas. On Table 6b, where relevant, these figures are indicated as estimates.

Regional peat volume estimates were calculated by multiplying the area of a particular peatland type in each study area by the measured average depth under that peatland type in each study area, and then adding all the volumes for each peatland type in each study area (*see* Table 7).

The area covered by each peatland type was calculated in the manner outlined above. The best available data on average peat depth derives from the detailed and reconnaissance surveys done by the project teams. Average depths were calculated by two methods. First, average peat depths for each peatland type were calculated by averaging the depths of all the peat cores sampled by inventory project teams (Table 6c). Secondly, average peat depths for each peatland type were calculated by averaging the average peat depth per site for each peatland type, where there were three or more peat core depths per peatland type (Table 6d). This latter figure was considered to be a more conservative expression of peat depth, and more appropriate for extrapolating to other unsurveyed sites in the study area. This figure is less liable to be skewed by a large number of data derived from the survey of a few anomalously deep sites, in which project teams were expected to conduct more dense sampling. Table 7 presents these overall volume estimates for the study area, calculated on this basis.

3.7 REGIONAL OVERVIEW OF PEATLAND VEGETATION

For the sites surveyed in each study area by the project teams, Open File Reports characterized the vegetation as it was surveyed by the team field botanist, usually on a site-by-site basis. In most cases, the text on specific survey sites included descriptive summary text, and in some cases quantitative data was organized into dominance types for each peatland type, and tables listing the species present and the percentage cover values of each species. Several Open File Reports also included overall study area floristic checklists. The completed site data forms recording these data are maintained on file at the Engineering and Terrain Geology Section, Ontario Geological Survey.

During helicopter-supported reconnaissance of the peatlands of the study area, the senior author collected phytosociological data on the vegetation occurring in peatland ecosystems. These were completed on standard site data record forms, as indicated in Section 3.1. All vascular plant determinations were made by the senior author; all sphagnum specimens were determined by H. Crum (University of Michigan, Ann Arbor); all other moss specimens were determined by R.R. Ireland (National Museum of Natural Sciences, Ottawa); liverworts by L. Ley (National Museum of Natural Sciences, Ottawa); and lichens by P.W. Wong (National Museum of Natural Sciences, Ottawa). Bryophyte nomenclature generally follows that of Ireland et al. (1980).

The sites studied were complexes of numerous peatland types and the quantitative data collected on a series of 5 m radius plots can be viewed as a series of "snapshots" taken along the gradient of variation expressed in the vegetation of peatlands in northwestern Ontario. These data include the following 133 peatland sampling sites: open bog sites (9 dwarf shrub, 12 low shrub, 33 graminoid); treed bog sites (10 low-density, 9 medium-density, 3 high-density); open fen sites (7 shrub-rich, 27 graminoid, 6 pools); treed fen sites (7 low-density, 2 medium-density, 2 high-density); open poor fen sites (2); treed poor fen sites (3); and marsh sites (1). Excluded from this data set were sites which were successional types following clear-cut, burns, or anthropogenic site modifications.

The above listing of types shows an undersampling of heavily treed sites, conifer swamps, thicket swamps and marshes. From the project teams' site data, a number of additional site data sets were added: conifer swamp sites (9); thicket swamp sites (6); open fen sites (5 low shrub, 2 graminoid); treed fen sites (5); open poor fen sites (1); marsh sites (4).

These additional data were collected by N. Patterson (16 sites, Northland Associates Ltd. 1984), J. Gagnon (10 sites, Dendron Resource Surveys Ltd. 1986), J. Kaiser (1 site, Proctor and Redfern Group Ltd. 1984), and B. Grimard (Phantom Exploration Services Ltd. 1985).

Evaluation of this data base consisted largely of a tabulation of the data set in the form of mean values for each major peatland type:

Table 8. Minor element composition of surface waters. Based on sampling sites indicated above, collected by the senior author; reported as mean values, ±1 x standard deviation, and range of values for Ca, Fe, Mg, Mn, Cu, Zn; all values in ppm, by ICAP spectrometry (Ontario Geological Survey Geosciences Laboratories), on samples from 10 to 15 cm below water tables, filtered through Whatman 40 Ashless filter papers.

Table 9. Physiognomic and environmental characteristics of peatland classification units. Based on sampling sites indicated above; reported as mean values, ±1 x standard deviation, and range of values for surface water pH, average depth-to-water, peat depth, percent tree species cover greater than 150 cm, percent shrub species cover greater than 150 cm, percent shrub/tree species cover less than 150 cm, percent graminoid/herb cover, percent bryophyte/lichen cover, and average number of vascular plant species.

Appendix E. Species composition of peatland vegetation Types. Based on sampling sites indicated above; mean cover percentage values (and percentage frequency values).

Phytosociological synopses of this type are presented as baseline data on the vegetation of peatlands in the region. The peatland types are presented in a more descriptive, comparative manner in Appendix C.

4.0 Regional Setting Of Northwestern Ontario Study Areas

The physical environment has a critical role in the evolution of peatlands and the accumulation of various types of peat materials and deposits. As with other types of vegetation, peatlands can be viewed as ecosystems integrating environmental processes of geology, geomorphology, hydrology and climate. In addition, peatland vegetation creates its own substrate environment through organic deposition and landscape paludification.

The following discussion summarizes the regional setting of peatlands in northwestern Ontario in terms of bedrock geology (Section 4.1) and glacial and postglacial history (Section 4.2), both of which contribute the overall physiographic setting in which peatlands have developed (Section 4.3). These factors combine with the climate (Section 4.5) and ambient modern vegetation (Section 4.4) of the region, to define the regional environmental setting of the inventory study areas.

4.1 BEDROCK GEOLOGY

The northwestern Ontario study areas are situated on a series of easterly trending structural belts or subprovinces within the Archean Superior Province. The most widespread bedrock assemblages consist of metavolcanic rocks, metaclastic rocks and minor metasedimentary rocks (greenstone units) wedged between extensive granitic intrusive rocks (Mackasey et al. 1974; Blackburn 1981; Breaks et al. 1980; Ferguson et al. 1970; Pyke and Fenwick 1965, 1972; Innes and Ayres 1971; Carter et al. 1973; Blackburn et al. 1985).

Proterozoic diabase intrusive rocks surround Lake Nipigon, underlying the southern half of the Armstrong study area and to a lesser extent in the northern half of Armstrong and eastern reaches of the Longlac–Nakina study areas.

4.2 GLACIAL AND POSTGLACIAL HISTORY

Glacial and postglacial features and deposits occur throughout northwestern Ontario. The surficial geology of the region has been mapped by Zoltai (1965b, 1965c). Terrain studies published at a scale of 1:100 000 have been undertaken for the whole area, details of which can be found in Gartner et al. (1981).

The Late Wisconsinan glaciation of northwestern Ontario was followed by a complex deglaciation history, resulting from pulsating ice lobes in the area and corresponding fluctuations of proglacial lake water levels (Prest 1970).

The earliest recognized ice movements over most of the area came from the northeast, although signs of an even earlier advance from the northwest have been recorded in the Rainy River area and in the western portion of the Dryden–Lac Seul study area (Zoltai 1961). A later ice lobe entraining a calcareous clay till from the west covered the Rainy River study area. The retreat of this lobe gave rise to a marginal lake (early phases of Lake Agassiz) which subsequently drained, exposing the sediments to wind erosion.

After the drainage of this phase of Lake Agassiz, an ice mass advanced from the northeast, terminating in the northeastern end of the Rainy River study area at the Lake of the Woods–Rainy Lake Moraine (Zoltai 1961). This glacier spread a sandy granitic till over most of the area (Zoltai 1965b, 1965c).

The next stage was marked by an episodic retreat of the glacier toward the northeast and the transgression of Lake Agassiz. This period started approximately 11 600 years ago in the Rainy River study area (Clayton and Moran 1982; Clayton 1983) and ended in Longlac–Nakina 9400 years ago (Zoltai 1967). A later ice advance, known as the Cochrane Readvance, reached the northeasternmost portion of this latter area about 8000 years ago.

During the retreat, many end moraines were constructed as a result of periods of stagnation or readvance of the ice front. At the same time, numerous eskers were formed, and large expanses of outwash materials were deposited in front of the Hartman, Lac Seul and Sioux Lookout moraines, especially notable in the Ignace study area. Most of the major peatlands surveyed in this area are on the fine sandy outwash channels draining southwest from these moraines. These peatlands are often characterized by surfaces sloping to the southwest, with minerotrophic tendencies attributable to ongoing groundwater movement through the sites.

As the glacier front receded to the northeast, Lake Agassiz transgressed across low-lying areas as they became free of ice. This lacustrine episode was marked by different stages in which the water level was controlled by the position of the ice front in relation with the eastern outlets, and by the differential isostatic uplift affecting the level of the southern outlets (Prest 1970). As a result, the lake drained alternately into the Mississippi and Lake Superior basins (Clayton and Moran 1982; Clayton 1983). By approximately 8500 years ago, the ice mass had retreated north of the divide between the Superior and Hudson Bay watersheds, and Lake Agassiz was directed toward the east, along the ice margin, into proglacial Lake Ojibway (Teller 1985).

During the existence of Lake Agassiz, varved clay and silt were deposited in lower areas. These varved sediments occur mainly in the Dryden–Lac Seul and Rainy River study areas. Toward the east, lacustrine sediments are less common, and include a coarser fraction which indicates that they were deposited in shallower water environments.

In the Armstrong and Longlac–Nakina study areas, the deglaciation and lacustrine history is more complex. During the late glacial period, three ice lobes were pulsing over the area (Zoltai 1967). In addition, the Cochrane Readvance extended into the northeastern portion of Longlac–Nakina study area approximately 8000 years ago. Four major glacial lakes occupied different parts of the area north of Lake Superior. These were 1) Lake Kelvin in the Nipigon basin, 2) Lake Nakina to the east, 3) Lake Barlow–Ojibway in the northeast and 4) Post-Minong phase of Lake Superior which extends northward from the Lake Superior basin into the southeastern portion of the Longlac–Nakina study area. These proglacial lakes deposited large areas of sandy and varved sediments. They drained some time prior to 6000 years ago (Zoltai 1967).

After the withdrawal of the ice mass and the drainage of the proglacial lakes, the emergent landscape was soon colonized by vegetation. Extensive wind erosion and deposition occurred as well, resulting in many dune fields in the Ignace, Armstrong and Longlac–Nakina study areas, and a loess veneer in parts of the Ignace study area.

In northwestern Ontario, the postglacial climate and vegetation evolution are not well documented. A recent study by Bjorck (1985) is the only regional overview pertaining directly to this region. However, other pollen studies from the adjacent areas are also relevant to this region, including those of Ritchie (1983) in Manitoba; Craig (1972), Griffin (1977) and Janssen (1968) in Minnesota; and Terasmae (1967, 1968), Vincent (1973), Terasmae and Anderson (1970) and Richard (1980) east of the area.

The Rainy River area was the first of the study areas to be ice free. It was soon colonized by an open park-tundra vegetation with scattered stands of spruce (*Picea*), ash (*Fraxinus*) and elm (*Ulmus*) until 11 000 years ago (Bjorck 1985). It was followed by a cooler period (11 100 to 10 200 years ago) during which the ash and elm diminished. As the climate became warmer, this parkland vegetation was replaced by an open boreal forest of spruce, tamarack (*Larix*), birch (*Betula*), jack pine (*Pinus banksiana*) and red pine (*Pinus resinosa*). Farther northeast, the parkland vegetation stayed only for a short duration because of a later deglaciation and a more rapid migration of boreal forest species from the south, particularly red and jack pine.

In mid-postglacial time, 8000 to 3500 years ago, the first indications of a warmer and dryer climate (Hypsithermal Period) were an influx of prairie vegetation, combined with an increase of oak (*Quercus*) and ash, and a decrease in spruce (Janssen 1968; Bjorck 1985). However, this prairie influence was less apparent toward the northeast. The climatic optimum was reached 7000 years ago, after which the climate became more humid (Ritchie 1983). Meanwhile the white pine (*Pinus strobus*) migrated into the area. It reached its maximum distribution between 6500 and 6000 years ago.

A continuing climatic deterioration toward cooler and wetter conditions favoured an increase in spruce, and especially black spruce (*Picea mariana*), over other tree species. This modern boreal vegetation was initiated approximately 3000 years ago.

Peatlands probably started to form in some areas shortly after the land was freed from ice or proglacial waters. Studies in northern Minnesota, however, suggest that peat formation occurred mostly during the post-Hypsithermal Period, since 4000 to 2500 years ago (Griffin 1977; Glaser et al. 1981).

4.3 PHYSIOGRAPHY

The study areas in northwestern Ontario correspond to the Severn and Abitibi uplands of the James Region, as described by Bostock (1970). These uplands are characterized by broad, gently to moderately rolling terrain. Zoltai (1965b, 1965c) has mapped the surficial geomorphology of the region, which provides further information on the physiography.

The existing topography has been modified by erosional and depositional action during glacial and postglacial time. Throughout most of the region, the bedock is mantled by a thin veneer of till.

Interlobate and end moraines situated across the region, have a rough, hummocky topography. Some of these moraines have been modified by proglacial lakes. The most prominent moraines in the region are the Hartman, Lac Seul, Sioux Lookout and Nakina moraines, which trend in a northwest-southeast direction. Smaller, gently rolling washboard moraines, occurring in the Sioux Lookout study area, consist of elongated, straight hills in groups of five to twenty (Zoltai 1965a).

Eskers and esker complexes are concentrated in the eastern part of the region trending southwesterly; few occur southwest of the Hartman Moraine.

Outwash and loess plains occur mainly in the Ignace and Longlac–Nakina study areas. Sand dunes are scattered throughout the outwash areas as well.

Glaciolacustrine deposits occur as broad bands of flat to gently undulating terrain throughout the region. In the Rainy River study area, these deposits form a flat to very gently undulating plain.

Elevations for the region gently rise from 225 m above sea level (a.s.l.) in the north and northeast to 450 m a.s.l. in the south, with an average elevation ranging from 275 to 365 m a.s.l. The relief ranges up to 30 to 50 m in most of the region but, between Lake Superior and Longlac it can rise up to 150 m.

The region contains three major watersheds, with most of the water flowing north into Hudson Bay via meandering rivers such as the Albany, Severn, Ogoki and Pipestone. The English River and Lake of the Woods drain toward the west into Lake Winnipeg. The Lake Nipigon basin drains into Lake Superior, as do other rivers along the north shore of Lake Superior.

4.4 VEGETATION

Most of the study areas are located in the Boreal Forest Region, as described by Rowe (1972). From east to west, the Central Plateau, the Nipigon, the Northern Coniferous and the Upper and Lower English River sections are the forest subdivisions of the region. The Quetico and Rainy River Forest sections encompass the Rainy River study area and the southern part of the Dryden–Lac Seul study area.

The prominent boreal forest species, black spruce, jack pine, trembling aspen and white birch, dominate a wide range of habitats. In wetland areas, tamarack accompanies black spruce. On the sand and gravel deposits and low rocky outcrops, jack pine, white birch, trembling aspen, balsam fir, balsam poplar and white spruce are most common. The Upper English River Section is a transitional zone from the Great Lakes–St. Lawrence Forests in the south to the Boreal Forests in the north and east. Red and white pine are found as isolated stands near their northern limits, but occur frequently in the Quetico and Rainy River forest sections.

The Quetico Forest Section of the Great Lakes–St. Lawrence Region is dominated by white and red pine communities. Jack pine and other species have become more prominent due to logging activities and recent fires. In the north, the uplands are more typical of the boreal forest with balsam fir-white spruce-birch communities present. The wetlands of the area are dominated by black spruce and tamarack. White cedar can be found growing along lakeshores and in rich swamps. To the south and east there are scatterings of basswood, sugar maple, Manitoba maple, red and bur oak.

In the Rainy River Section, the formerly abundant red and white pine are being generally superseded by jack pine on logged or burnt-over sites. Trembling aspen is common throughout. In the wetlands, black spruce, tamarack, white cedar, willow and alder are present.

In northwestern Ontario in general, black spruce, jack pine, trembling aspen and white birch are the most common species, with tamarack accompanying the dominant black spruce in the forested lowlands. In the Rainy River area, mixed conifer-hardwood forest of the Great Lakes–St. Lawrence Forest Region dominates. The forest landscape of the whole region has been historically modified by lumbering and clearing activities, extensive fires, blowdowns and forest pathogens.

4.5 CLIMATE

The study areas lie within three climatic regions, the English River, the Rainy River–Thunder Bay and the Height of Land, as described by Chapman and Thomas (1968). Other references of interest pertaining to climate as it relates to peat production are Monenco Ontario Ltd. (1981) and Ecologistics Ltd. (1985). The climate is characterized by long, cold winters and short, cool summers. Most of the region has a modified continental climate, modified by Hudson Bay to the northeast and the Great Lakes to the southeast. Rainy River has a subhumid continental climate. The climate varies considerably across the northwestern Ontario study areas.

Data from several stations for the 1931–1960 period show a range of mean annual temperatures of 0°C to 3°C, average January temperature of -23°C to -12°C, average July temperatures of 12°C to 25°C and a mean annual precipitation of 635 to 762 mm.

The region receives between 125 and 130 days of measurable precipitation per year. During the summer months (May to September), there are 64 to 79 days of measureable precipitation (Environment Canada 1982), and a summer range of 381 to 406 mm of precipitation in the region (Chapman and Thomas 1968). Winter precipitation increases from west to east across the region, with 1525 mm at the Manitoba border and 2440 mm in the Ignace area.

The range of mean annual potential and actual evapotranspiration is 483 to 533 mm and 508 to 533 mm, respectively. The mean moisture deficiency ranges from 0 to 25 mm and the mean water surplus ranges from 127 mm in the west to 279 mm in the east.

The frost free period varies throughout the region from 80 to 108 days. The last frost occurs between May 30 and June 15 and the first frost occurs between September 2 and 12. The growing season varies between 162 and 175 days.

In the provincial context, the climate can be considered to have long, cold winters and short, cool summers and a short growing season. Prevailing winds are from the southwest (average 7 to 15 km/hr) in the summer and from the northwest in the winter. Cyclonic storms bring warm, humid air masses from the south to mix with cool, dry air from the north. The region is generally under the influence of continental air masses from the west.

In comparison with the climate of northeastern Ontario, the northwest is drier, but otherwise similar. The climate of northwestern Ontario is similar to the peat producing areas of Finland, Minnesota, New Brunswick and Quebec.

Based on the frequency of dry periods of various lengths in the Dryden area over a 40-year period (Chapman and Thomas 1968, Figure 37), there appear to be a likelihood of approximately 15 to 16 periods of 3 to 4 consecutive dry days per summer (May 15 to September 15), equivalent to about the same number of possible peat harvests by conventional milled peat harvesting methods. This frequency would vary considerably on a year to year basis.

Ecologistic Ltd. (1985) employed a meteorological simulation model developed for agriculture, adapted to the problems of peat production, to calculate a mean estimated production rate for the Fort Frances area of 11 to 12 harvests per year. However, the lack of actual peat production data for northwestern Ontario prevents validation of the modelling approach at this time.

5.0 Peat And Peatlands Of The Study Areas

In the 6 study areas, 53 peatlands were surveyed in detail (Table 4). These peatlands covered a total of almost 46 700 ha, 40 percent of which was found to have peat over 2 m deep. A total of 25 of these sites included areas greater than 150 ha with peat greater than 2 m deep. An additional 92 sites were surveyed at a reconnaissance level covering a further 26 000 ha of peatland (Table 5).

The following discussion is intended to complement the more intensive treatments of the Open File Reports. This discussion provides additional information on different aspects of the peat and peatland resources of each study area, and integrates inventory data (Appendix A) with remote sensing results. It also present estimates of the total peatland area and peat volumes of each study area (Tables 6, 7).

TABLE 4. SUMMARY OF DETAILED SURVEYS IN NORTHWESTERN ONTARIO.

Study Area	Rainy River	Dryden-Lac Seul	Sioux Lookout	Ignace	Armstrong	Longlac-Nakina	Totals
No. of sites	12	7	8	10	6	10	53
Total peatland area (ha)	18 660	4 939	1 709	13 851	2 869	4 653	46 681
Total peat volume ($x10^6m^3$)	491.3	52.7	23.6	180.1	35.5	66.3	849.5
Volume of well-humified peat ($H4^+$) ($x10^6m^3$)	259.0	34.8	19.4	64.5	6.1	25.0	408.8
Total area >2 m deep (ha)	12 041	644	465	3 488	587	1 602	18 827
Total peat volume in area >2 m deep ($x10^6m^3$)	430.5	19.8	14.7	106.0	18.9	42.4	632.3
Volume of well-humified peat (H^+) in area >2 m deep ($x10^6m^3$)(% of total volume in same area)	215.5 (50%)	14.0 (71%)	13.0 (88%)	50.3 (48%)	2.9 (15%)	18.6 (44%)	314.3 (50%)
No. of sites with >150 ha of area >2 m deep	9	2	1	7	1	5	25

TABLE 5. SUMMARY OF RECONNAISSANCE SURVEYS IN NORTHWESTERN ONTARIO.

Study Area	Rainy River	Dryden-Lac Seul	Sioux Lookout	Ignace	Armstrong	Longlac-Nakina	Totals
No. of sites	17	18	15	18	8	16	92
Total peatland area (ha)	11 322	2 472	2 245	4 731	638	4 469	25 877
Total estimated peat volume ($x10^6m^3$)	292.5	67.0	52.4	128.1	16.4	121.8	678.2
Estimated volume of well-humified peat ($H4^+$) ($x10^6m^3$) (% of total volume in same sites)	189.8 (65%)	45.7 (68%)	45.7 (87%)	62.5 (49%)	6.4 (39%)	62.0 (51%)	412.1 (61%)

TABLE 6A. PEATLANDS OF STUDY AREAS IN NORTHWESTERN ONTARIO—PEATLAND TYPES SURVEYED IN INVENTORY FIELD STUDIES (ha) (% of totals).

Study Area	Size of Study Area (ha)	Open Bog	Treed Bog	Open Fen	Treed Fen	Open Poor Fen	Treed Poor Fen	Conifer Swamp	Hardwood/ Mixed Swamp	Thicket Swamp	Marsh	Total (ha)
Rainy River	460 000	5 308 (18)	4 891 (16)	3 462 * (12)	2 996 * (10)	----	----	5 307 (18)	----	4 021 (13)	3 948 (13)	29 993
Dryden-Lac Seul	2 400 000	1 735 (23)	3 073 (42)	1 013 (14)	1 061 (14)	31 (<0.5)	69 (0.9)	290 (4)	----	116 (2)	20 (<0.5)	7 408
Sioux Lookout	1 600 000	633 (16)	718 (18)	390 (10)	532 (14)	31 (0.8)	9 (<0.5)	1 300 (33)	----	341 (9)	----	3 954
Ignace	1 600 000	4 128 (17)	7 977 (33)	4 823 * (20)	2 993 * (12)	----	----	2 880 (12)	----	164 (1)	1 485 (3)	24 540 (incl. 89 ha cutover)
Armstrong	347 000	417 (11)	1 365 (35)	502 * (13)	1 621 * (42)	----	----	----	----	5 (<0.5)	----	3 910
Longlac-Nakina	2 400 000	515 (6)	204 (2)	3 049 (34)	2 622 (29)	367 (3)	236 (3)	1 488 (16)	62 (0.7)	133 (2)	429 (5)	9 104
Totals	8 797 000 ha	12 737 (16)	18 228 (23)	13 668 * (17)	12 139 * (15)	----	----	11 265 (14)	62 (-)	4 780 (6)	5 881 (8)	78 849 ha
Totals excluding Rainy River	8 347 000 ha	7 429 (15)	13 337 (27)	10 206 * (21)	9 143 * (19)	----	----	5 958 (12)	62 (-)	759 (1.6)	1 933 (4)	48 916 ha

* *Includes Poor Fen.*

TABLE 6B. PEATLANDS OF STUDY AREAS IN NORTHWESTERN ONTARIO—TOTAL PEATLAND AREA OCCURRING IN STUDY AREAS, BASED ON INTEGRATION OF FIELD STUDIES AND LANDSAT 2 IMAGERY INTERPRETATION (ha) (% of totals).

Study Area	Size of Study Area (ha)	Open Bog	Treed Bog	Open Fen	Treed Fen	Conifer Swamp	Hardwood/ Mixed Swamp	Thicket Swamp	Marsh	Total (ha)	% of Total Study Area
Rainy River	460 000	15 115 (13.0)	14 179 (12.2)	8 830 * (7.6)	10 582 * (9.1)	22 782 (19.6)	est. 6 000 (5.2)	31 024 (26.7)	est. 7 700 (6.5)	116 112	25.2
Dryden-Lac Seul	2 400 000	3 770 (4.5)	21 447 (25.4)	2 869 * (3.4)	6 231 * (7.4)	est. 35 239 (41.8)	est. 400 (<0.5)	est. 10 000 (11.9)	est. 4 385 (5.2)	84 341	3.5
Sioux Lookout	1 600 000	6 225 (6.6)	8 675 (9.1)	9 429 * (9.9)	7 145 * (7.5)	est. 48 081 (50.6)	----	est. 12 858 (13.5)	2 685 (2.8)	95 096	5.9
Ignace	1 600 000	8 814 (4.6)	37 983 (19.7)	9 718 * (5.0)	29 320 * (15.2)	84 587+ (43.8)	est. 200 (-)	13 156 (6.8)	est. 9 758 (5.1)	193 536	12.1
Armstrong	347 000	est. 500 (5.2)	est. 2 080 (21.7)	est. 550 (5.7)	est. 2 050 (21.4)	est. 3 100 (32.4)	----	est. 1 000 (10.4)	est. 300 (3.1)	9 580	2.8
Longlac-Nakina	2 400 000	4 034 (2.0)	9 334 (4.6)	11 720 (5.8)	32 988 (16.4)	est. 106 337 (52.8)	est. 2 525 (1.3)	est. 23 460 (11.6)	est. 11 110 (5.5)	201 508	8.4
Totals	8 797 000 ha	38 458 (5.5)	93 698 (13.4)	43 116 (6.2)	88 316 (12.6)	est. 300 126 (42.9)	9 125 (1.3)	91 498 (13.1)	35 836 (5.1)	700 173 ha	8.0%
Totals excluding Rainy River	8 347 000 ha	23 343 (4.0)	79 519 (13.6)	34 286 (5.9)	77 734 (13.3)	est. 277 344 (47.5)	3 125 (0.5)	60 474 (10.4)	28 236 (4.8)	584 061 ha	7.0%

* *Includes Poor Fen.*

+ *Conifer swamp, thicket swamp and marsh may be underestimated.*

TABLE 6C. PEATLANDS OF STUDY AREAS IN NORTHWESTERN ONTARIO—AVERAGE PEAT DEPTH (m), BASED ON TOTAL NUMBER OF PEAT CORES (no. of cores).

Study Area	Open Bog	Treed Bog	Open Fen	Treed Fen	Open Poor Fen	Treed Poor Fen	Conifer Swamp	Hardwood/ Mixed Swamp	Thicket Swamp	Marsh	Average depth (m)
Rainy River	3.6 (466)	4.0 (445)	2.6 * (141)	2.8 * (167)	----	----	3.2 (243)	----	2.0 (62)	1.3 (205)	3.2 (1729)
Dryden–Lac Seul	2.0 (274)	1.9 (381)	1.9 (106)	1.7 (92)	1.6 (5)	2.2 (6)	2.5 (23)	----	0.9 (7)	2.5 (3)	1.9 (897)
Sioux Lookout	2.8 (123)	2.3 (82)	3.1 (43)	2.3 (93)	2.2 (14)	3.7 (3)	2.0 (30)	----	0.8 (7)	----	2.5 (395)
Ignace	2.4 (339)	2.4 (578)	2.2 * (437)	2.6 * (93)	----	----	1.8 (11)	----	2.0 (2)	3.4 (3)	2.4 (1463)
Armstrong	2.7 (65)	2.5 (117)	2.0 * (96)	2.1 * (24)	----	----	----	----	----	----	2.4 (302)
Longlac–Nakina	2.8 (47)	2.9 (13)	2.4 (415)	2.1 (269)	2.3 (6)	2.2 (1)	0.8 (5)	----	----	----	2.3 (756)
Average depth (m)	2.8 (1314)	2.7 (1616)	2.3 * (1122)	2.3 * (748)	----	----	3.0 (312)	----	1.8 (78)	1.4 (211)	2.5 (5542)
Average depth excluding Rainy River (m)	2.4 (848)	2.3 (1171)	2.3 * (1263)	2.2 * (581)	----	----	2.1 (69)	----	1.0 (16)	3.0 (6)	2.3 (3813)

* *Includes Poor Fen.*

TABLE 6D. PEATLANDS OF STUDY AREAS IN NORTHWESTERN ONTARIO—AVERAGE PEAT DEPTH (m), BASED ON THE AVERAGE PEAT DEPTH PER SITE, WHERE THERE WERE GREATER THAN THREE CORES PER PEATLAND TYPE (no. of sites).

Study Area	Open Bog	Treed Bog	Open Fen	Treed Fen	Open Poor Fen	Treed Poor Fen	Conifer Swamp	Hardwood/ Mixed Swamp	Thicket Swamp	Marsh
Rainy River	3.3 (14)	3.9 (9)	2.9* (8)	3.0* (5)	----	----	2.8 (11)	----	1.7 (6)	1.4 (6)
Dryden-Lac Seul	3.3 (11)	2.6 (15)	2.5 (5)	2.0 (6)	----	----	2.6 (2)	----	----	----
Sioux Lookout	2.5 (12)	2.1 (11)	3.3 (4)	2.1 (8)	2.5 (2)	----	2.1 (3)	----	0.9 (1)	----
Ignace	2.7 (13)	2.6 (21)	2.3* (13)	2.1* (9)	----	----	2.0 (1)	----	----	----
Armstrong	2.6 (7)	2.4 (6)	2.3* (9)	2.4* (3)	----	----	----	----	----	----
Longlac-Nakina	2.6 (4)	2.9 (2)	2.7 (16)	2.1 (13)	----	----	----	----	----	----
Average depth (mean ± standard deviation, range, n=x)(m)	2.9±0.9 0.9-4.5 n=61	2.7±1.0 1.1-5.1 n=64	2.6±0.8* 1.2-5.2 n=55	2.2±0.9* 0.6-4.2 n=44	----	----	2.6±1.0 0.8-4.1 n=17	----	1.6±0.6 0.9-2.3 n=7	1.4±1.1 0.3-3.5 n=6
Average depth excluding Rainy River (m)	2.8±1.0 0.9=4.5 n=47	2.5±1.0 1.1-5.1 n=55	2.6±0.8* 1.2-5.2 n=47	2.1±0.9* 0.6-4.2 n=39	----	----	2.2±0.6 1.1-2.6 n=6	----	0.9±0.0 n=1	----

* *Includes Poor Fen.*

TABLE 7. REGIONAL PEAT VOLUME ESTIMATES, NORTHWESTERN ONTARIO.

Peatland Type	RAINY RIVER			DRYDEN-LAC SEUL			SIOUX LOOKOUT			IGNACE			ARMSTRONG			LONGLAC-NAKINA		
	Area x (ha)	Average = Depth(m)	Volume (x10^{6}m^3)	Area x (ha)	Average = Depth(m)	Volume (x10^{6}m^3)	Area x (ha)	Average = Depth(m)	Volume (x10^{6}m^3)	Area x (ha)	Average = Depth(m)	Volume (x10^{6}m^3)	Area x (ha)	Average = Depth(m)	Volume (x10^{6}m^3)	Area x (ha)	Average = Depth(m)	Volume (x10^{6}m^3)
Open Bog	15 115	3.3	498.8	3 770	3.3	124.4	6 225	2.5	155.6	8 814	2.7	238.0	est. 500	2.6	13.0	4 034	2.6	1 104.9
Treed Bog	14 179	3.9	553.0	21 447	2.6	557.6	8 675	2.1	182.2	37 983	2.6	987.6	est. 2 080	2.4	49.9	9 334	2.9	270.7
Open Fen*	8 830	2.9	256.1	2 869	2.5	71.7	9 429	3.0	282.9	9 719	2.3	223.5	est. 550	2.3	12.7	11 720	2.7	316.4
Treed Fen*	10 582	3.0	317.5	6 231	2.0	124.6	7 145	2.1	150.1	29 320	2.1	615.7	est. 2 050	2.4	49.2	32 988	2.1	692.7
Conifer Swamp	22 782	est. 2.0	113.9	est. 35 239	est. 1.5	528.3	est. 48 081	est. 1.5	721.2	84 587	est. 1.5	1 268.8	est. 3 100	est. 1.5	46.5	est. 106 337	est. 1.5	1 595.1
Hardwood/ Mixed Swamp	est. 6 000	est. 1.0	60.0	est. 400	est. 1.0	4.0	---	---	---	est. 200	1.0	2.0	---	---	---	est. 2 525	est. 1.0	25.3
Thicket Swamp	31 024	est. 1.4	434.3	est. 10 000	est. 1.0	100.0	est. 12 858	est. 1.0	128.6	13 156	est. 1.0	131.6	est. 1 000	est. 1.0	10.0	est. 23 460	est. 1.0	234.6
Marsh	est. 7 600	1.4	106.4	est. 4 385	est. 1.0	43.9	2 683	est. 1.0	26.8	est. 9 758	est. 1.0	97.6	est. 300	est. 1.0	3.0	est. 11 110	est. 1.0	111.1
Total Volume (x10^{6}m^3)			2 340.0			1 554.8			1 647.4			3 564.8			184.3			3 350.8
Total for Bog and Fen (x10^{6}m^3)(% total)			1 625.4 (69.5)			878.3 (56.5)			770.8 (46.8)			2 064.8 (57.9)			124.8 (67.7)			1 384.7 (44.4)

** Includes Poor Fen.*
(% of regional total areas of bog and fen inventoried).

5.1 RAINY RIVER

The Rainy River study area (Figure 4; south and west of 49°N latitude and 93°W longitude) is on the margin of the Canadian Shield, primarily in the lowland formerly occupied by proglacial Lake Agassiz. From northeast to southwest across the study area, the topography shifts from a rolling upland with washed bedrock and sandy till, to gently undulating clayey till ground moraine, and then to low and flat lacustrine clay deposits, with varved clays and silts in the southwest.

This major gradation is paralleled by comparable changes in peatland characteristics, shifting from large topographically confined peatlands in the east, to very large blanket peatlands that have expanded laterally over flat clay terrain in the west.

This east-west gradation is also apparent in the trophic level of the peatland vegetation and water chemistry. Ombrotrophic conditions (bog), associated with deeper peats, tend to prevail to the east (sites 52C-44 and 52C-37), whereas in the westernmost sites, minerotrophic conditions (fen, meadow marsh), as well as shallower peats, are dominant (52D-15, 52D-16, 52D-21).

Almost 14 000 ha of peatland, at 12 sites, were surveyed in detail (Table 4 and Appendix A), with a measured total volume of 491 300 000 m^3 of *in situ* peat. Almost two thirds of the total area surveyed was more than 2 m deep, and this area contained about 430 500 000 m^3 of peat, 50 percent of which was well humified (von Post H4$^+$), suitable for consideration as potential fuel peat. The proportion of these deeper deposits which had tree cover less than 10 percent varied from 19 percent to 100 percent. Nine of the 12 sites surveyed in detail had areas greater than 150 ha with more than 2 m of peat, ranging from 363 to 2560 ha. On these sites, the proportion of these areas with tree cover less than 10 percent ranged from 19 percent to 75 percent.

Numerous other peatlands occur in the Rainy River study area, particularly in the southwest half, on the glaciolacustrine and clayey till deposits. A total of 17 of these were surveyed at a reconnaissance level, covering a total area of 11 300 ha (Table 5). These deposits have an estimated total peat volume of 292 500 000 m^3, 65 percent of which was found to be well-humified peat (von Post H4$^+$). Although only limited coring was undertaken on these sites, 14 of them appear to contain significant peat deposits in excess of 2 m deep, and had average areas of more than 200 ha total peatland.

Overall, the surveyed quantities of peat were highly significant, and most of the sites were accessible by roads. The data suggest almost equal proportions of unhumified peats of interest in terms of horticultural potential, and well-humified peats of interest in terms of fuel uses. Eight of the larger sites surveyed in detail had surficial unhumified peat thicker than 85 cm (averaged across the peatland area greater than 2 m deep). Although these sites contain significant volumes of unhumified peat, none were assigned a large-scale horticultural potential (*see* Appendix A). From all the requirements stated in Section 3.4, the two major criteria that were not met were the average fiber content (more than 60 percent) and pH (lower than 4.9). However, these average values were derived from a limited number of of samples representing entire peatlands, and significant portions of the larger sites may satisfy all the requirements for large-scale horticultural peat production regardless of the overall categorization presented in this report (*see* for example sites 52C-32, 52C-44 and 52D-43).

Open and treed bogs were the dominant peatland types surveyed (34 percent of peatlands surveyed) (Photo 1), followed by open and treed fens (22 percent). Open bogs and fens accounted for 40 percent of all the surveyed peatlands (Table 6a).

In the Rainy River study area as a whole, 25 percent of the entire area is estimated to be peatlands (Table 6b). Almost 60 000 ha have been classified as conifer swamp, thicket swamp and mixed swamp. Of more interest in terms of peat materials are the deeper, and less treed bogs and fens. Almost 30 000 ha of peatland are bog, and 15 000 ha of these are estimated to have tree cover of less than 10 percent. The more minerotrophic fen areas are less abundant, almost 20 000 ha, 9000 ha of which are open fen with tree cover less than 10 percent (Photo 2).

In the study area, the greatest peat depths occurred under bogs, conifer swamps and fens (Table 6c). Based on all of the peat cores taken in the area (1729 cores), their average peat depths were 3.8 m, 3.2 m and 2.7 m, respectively. Thicket swamps and marshes were all found to have peat depth figures averaging 2 m or less. These figures and depth figures derived from averaging peat depths per site (Table 6d), were used to estimate total peat volumes in the Rainy River study area (Table 7).

The total estimate of *in situ* peat occurring in open bogs in the Rainy River area is 498 800 000 m^3, with a further 553 000 000 m^3 in bog with tree cover ranging from 10 percent to ca. 25 percent. Open fens are estimated to contain 256 100 000 m^3, and treed fens 317 500 000 m^3. As a result, it is estimated that the total peat volume occurring in peatlands which are predictably deeper than 2 m is in the order of 1 625 400 000 m^3 of *in situ* peat. The extensive areas of shallower peats occurring under thicket swamp, conifer swamp and marsh contain further peat volumes in the order of 2 340 000 000 m^3 of *in situ* peat.

5.2 DRYDEN–LAC SEUL

The Dryden–Lac Seul study area (Figure 4; 49°30′ to 51°N latitude, 92° to 94°W longitude) lies en-

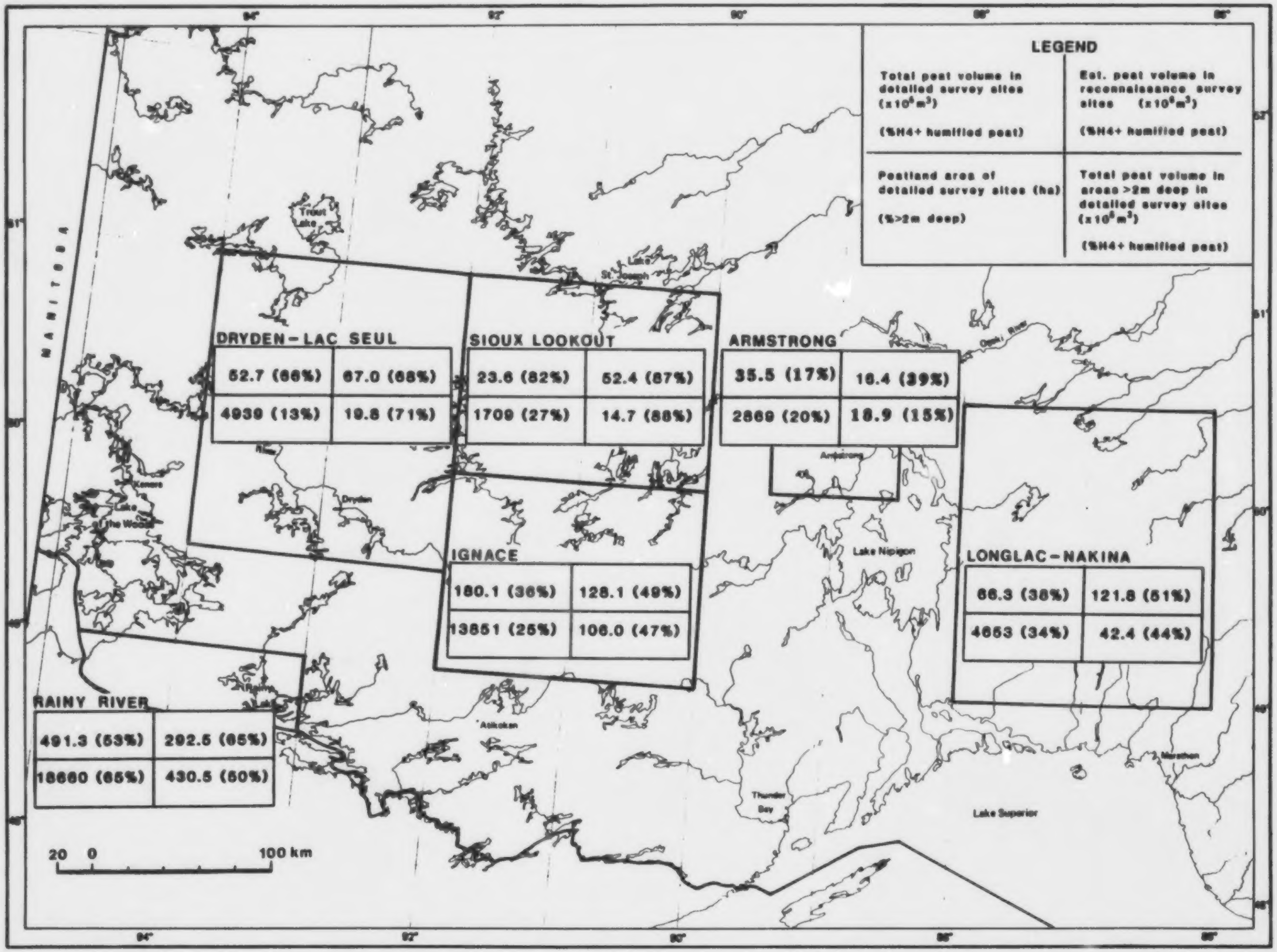
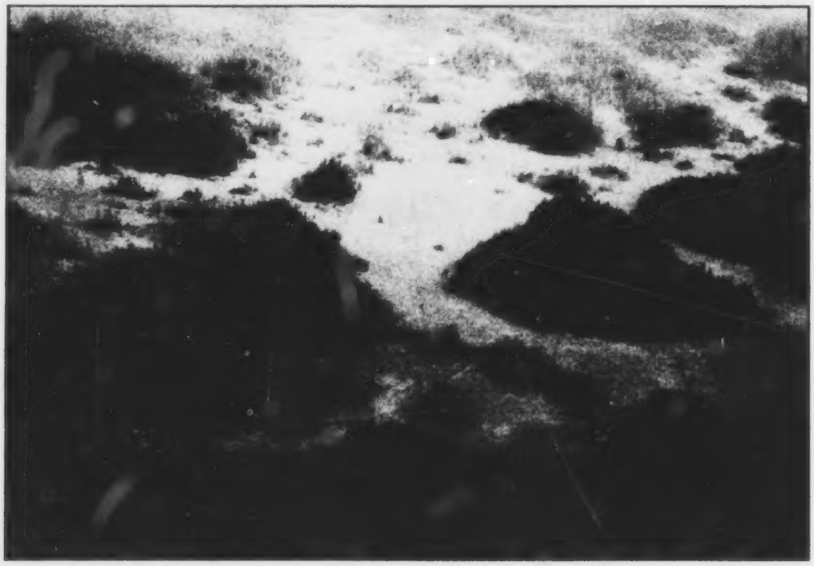

LEGEND
Total peat volume in detailed survey sites (x10⁶m³)
(%H4+ humified peat)
Est. peat volume in reconnaissance survey sites (x10⁶m³)
(%H4+ humified peat)
Peatland area of detailed survey sites (ha)
(%>2m deep)
Total peat volume in areas >2m deep in detailed survey sites (x10⁶m³)
(%H4+ humified peat)
DRYDEN-LAC SEUL
52.7 (66%)
67.0 (68%)
4939 (13%)
19.8 (71%)
SIOUX LOOKOUT
23.6 (82%)
52.4 (87%)
1709 (27%)
14.7 (88%)
ARMSTRONG
35.5 (17%)
16.4 (39%)
2869 (20%)
18.9 (15%)
IGNACE
180.1 (36%)
128.1 (49%)
13851 (25%)
106.0 (47%)
LONGLAC-NAKINA
66.3 (38%)
121.8 (51%)
4653 (34%)
42.4 (44%)
RAINY RIVER
491.3 (53%)
292.5 (65%)
18660 (65%)
430.5 (60%)
MANITOBA
Trout Lake
Lake St. Joseph
Ogoki River
Armstrong
Dryden
Kenora
Lake of the Woods
Atikokan
Lake Nipigon
Thunder Bay
Lake Superior
Marathon
94°
92°
90°
88°
86°
52°
51°
50°
49°
48°
20 0 100 km

Figure 4. *Surveyed peatland areas and peat volumes in northwestern Ontario.*

Photo 1. *At this open bog just north of Fort Frances (52C-37), the dwarf shrub cover of leatherleaf (Chamaedaphne calyculata) averages less than 20 cm tall. In this area, more than 90 percent of the total peat depth of 2.5 to 3.0 m is well-humified peat ($H4^+$ on the von Post scale).*



[illegible]oto 2. *The disjointed, "deltaic" patterning of this fen peatland in Nelles Township, Rainy River area, is probably unique [illegible]n northwestern Ontario; the site is a Provincial Nature Reserve (52D-29).*

tirely within the Precambrian Shield. Large bands of varved silt and clay were deposited in lowlying areas by proglacial Lake Agassiz. End moraines are also major glacial features in the area, specifically the Eagle–Finlayson, Hartman and Lac Seul moraines. Many of the peatlands surveyed were adjacent to these moraines, especially associated within discharge channels and outwash deposits located along the southwestern side of the moraines. These peatlands are usually characterized by sloping surfaces, and show minerotrophic tendencies.

In general, the study area is characterized by a large number of small peatlands, typical of most of the Precambrian Shield. However, some relatively large peat deposits occur on glaciofluvial and glaciolacustrine deposits.

Almost 5000 ha of peatland, at seven sites, were surveyed in detail (Table 4 and Appendix A) with a measured total volume of 52 700 000 m^3 of *in situ* peat. Only 13 percent of the total area surveyed was more than 2 m deep, and this area contained close to 20 000 000 m^3 of peat, 71 percent of which was well-humified peat (von Post H4$^+$) suitable for consideration as potential fuel peat. The proportion of these deeper deposits which had tree cover less than 10 percent varied from 0 percent to 91 percent, and on the two largest sites (greater than 150 ha with peat greater than 2 m deep) the areas with tree cover less than 10 percent were 0 percent and 74 percent, respectively.

Numerous other peatlands occur in the Dryden–Lac Seul study area. Eighteen of these were surveyed at a reconnaissance level, covering a total area of 2470 ha (Table 5). These sites have an estimated total peat volume of 67 000 000 m^3, 68 percent of which was found to be well-humified peat (von Post H4$^+$). Although only limited coring was undertaken on these sites, only two of them appeared to contain significant peat deposits in excess of 2 m deep, and average areas of more than 150 ha total peatland.

Overall, the surveyed quantities of peat suggest a predominance of well-humified peat of interest in terms of fuel uses. None of the larger sites surveyed in detail had surficial unhumified peat thicker than 1 m (averaged across the peatland area greater than 2 m deep). However, site 52F-60 with an average of 94 cm of unhumified peat over 412 ha shows some potential for large-scale horticultural peat operations.

Open and treed bogs were the dominant peatland types surveyed (65 percent of the peatlands surveyed) (Photo 3), followed by open and treed fens (28 percent). Peatlands with tree cover less than 10 percent accounted for 37 percent of all the surveyed peatland (Table 6a).

In the Dryden–Lac Seul study area as a whole, 3.5 percent of the entire landscape was estimated to be peatland (Table 6b). An estimated 35 000 ha were conifer swamp (42 percent of all peatland) (Photo 4), and another 10 000 ha were thicket swamp (12 percent). Of more interest in terms of peat resources are the deeper and less treed bogs and fens. They represent 40 percent of all the peatland in the area, and treed bog, the most common of these peatland types, was estimated to cover 21 500 ha (25.4 percent). Bogs and fens with tree cover less than 10 percent covered 8600 ha.

Based on all the peat cores taken in the study area (897 cores), the average peat depths for most of the peatland types ranged between 1.5 m and 2.5 m (Table 6c). In terms of average coring depth per peatland type (Table 6d), open bog had the greatest average peat depth (3.3 m), followed by treed bog (2.6 m), conifer swamp (2.6 m) and fens (2.2 m). These depth figures, derived from averaging peat depths per site (Table 6d), were used to estimate total peat volumes in the Dryden–Lac Seul study area (Table 7).

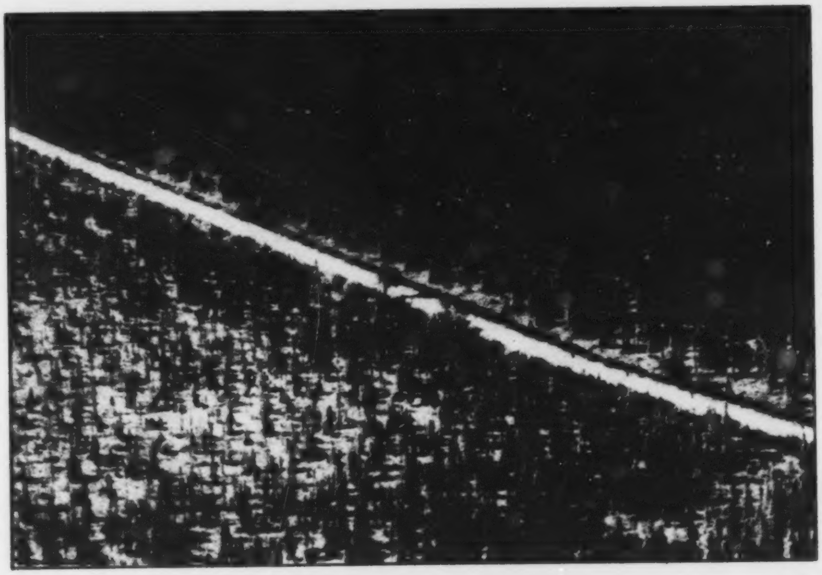


Photo 3. *A roadway south of Lac Seul bisects a treed bog (52K-83) which supports low density tree cover on the left (10 to 15 percent tree cover).*

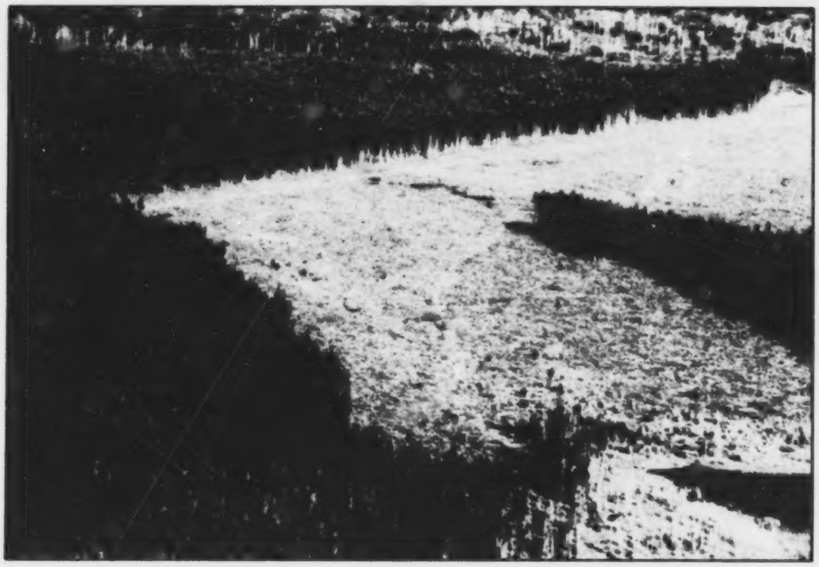


Photo 4. *At this site near Pakwash Lake (52K-20), the cutline across the conifer swamp shows the dense black spruce (Picea mariana) growth. In this swamp, Labrador tea (Ledum groenlandicum) and feathermoss (Pleurozium schreberi) are the dominant understorey species.*

The total estimate of peat volume occurring in open bog is 125 400 000 m^3, with a further 557 600 000 m^3 in bog with tree cover ranging from 10 to 25 percent. Open fens are estimated to contain 71 700 000 m^3 of *in situ* peat, and treed fens 124 600 000 m^3. As a result, these peatlands which are predictably deeper than 2 m contain an estimated volume of 878 300 000 m^3 of *in situ* peat. The extensive areas of shallower peat occurring under conifer swamp and thicket swamp contain further peat volumes in the order of 628 300 000 m^3, for a study area total of over 1 550 000 000 m^3 of *in situ* peat.

5.3 SIOUX LOOKOUT

The Sioux Lookout study area (Figure 4; 50° to 51°N latitude, 90° to 92°W longitude) contains numerous small and confined peatlands typical of the Precambrian Shield. In the area, sandy till ground moraine is the most widespread glacial feature. Most of the study area was inundated by proglacial Lake Agassiz, but the scarcity of glaciolacustrine features and deposits indicates that the lacustrine episode was of short duration.

Over 1700 ha of peatland, at eight sites, were surveyed in detail (Table 4 and Appendix A) with a measured total volume of 23 600 000 m^3 of *in situ* peat. Twenty-seven percent of the total area surveyed was more than 2 m deep, and this area contained 14 700 000 m^3 of peat, 88 percent of which was well-humified peat (von Post H4$^+$) suitable for consideration as potential fuel peat. The proportion of these deeper deposits which had tree cover less than 10 percent varied from 28 percent to 97 percent, but on the largest site (greater than 150 ha with peat greater than 2 m), the area with tree cover less than 10 percent was 33 percent (site 52J-29).

Numerous other peatlands occur in the Sioux Lookout area. Fifteen of these were surveyed at a reconnaissance level, covering a total of 2250 ha (Table 5). These sites have an estimated total peat volume of 52 400 000 m^3, 87 percent of which was found to be well-humified peat (von Post H4$^+$). Only limited coring was undertaken on these sites, but five of them appeared to contain significant peat deposits in excess of 2 m deep, and had average areas of more than 150 ha total peatland (for example, sites 52J-45 and 52J-173).

Again, the surveyed quantities of peat suggest a strong predominance of well-humified peat, and none of the larger sites surveyed in detail had surficial unhumified peat thicker than 60 cm (averaged across the peatland area greater than 2 m deep).

Conifer swamp was the dominant peatland type surveyed (33 percent of peatland surveyed), followed by open and treed bogs (34 percent), and by open and treed fens (24 percent). Peatlands with less than 10 percent tree cover accounted for 26 percent of all the surveyed peatlands (Table 6a).

Across the Sioux Lookout study area as a whole, 5.5 percent of the entire landscape was estimated to be peatland (Table 6b). An estimated 48 000 ha were conifer swamp (51 percent), and 12 900 ha were thicket swamp. Of more interest in terms of peat resources are the bogs and fens. They were estimated at 14 900 ha and 16 600 ha, respectively.

The bogs and fens with tree cover less than 10 percent were estimated to cover more than 15 000 ha.

In the study area, bogs and fens have the greatest peat depths (Tables 6c, 6d). Based on all the peat cores taken in the area (395 cores), fens had average peat depths of 2.8 m, and bogs had average depths of 2.6 m. The other peatland types were found to have peat depth averaging 2 m or less. These figures, and depth figures derived from averaging peat depths per site (Table 6d), were used to estimate total peat volumes in the study area (Table 7).

The total estimate of peat occurring in the Sioux Lookout study area is 1 647 400 000 m^3 of *in situ* peat. Open bogs were estimated to contain 155 600 000 m^3 of peat, with a further 283 000 000 m^3 in open fens. Bogs and fens with tree cover ranging from 10 to 25 percent were estimated to contain a volume of 332 300 000 m^3 of peat. As a result, it is estimated that the total peat volumes occurring in peatlands which are predictably deeper than 2 m are in the order of 770 800 000 m^3 of *in situ* peat. The extensive areas of shallower peats occurring under conifer swamp, marsh and thicket swamp contain further peat volumes in the order of 850 000 000 m^3 of *in situ* peat.

5.4 IGNACE

The Ignace study area (Figure 4; 49° to 50°N latitude, 90° to 92°W longitude) is on the drainage divide between the Hudson Bay (English River) and Great Lakes basins. In the southwest, the terrain has rugged Shield topography, with a thin discontinuous sandy till, and few large peatlands. Across the central part of the study area are extensive outwash deposits associated with the Hartman, Lac Seul and Sioux Lookout moraines. Almost all of the major peatlands of the study area are found on the fine sandy outwash channels draining southwest from these moraines, occupying channels which would have drained the ice front melt-out waters westward towards Lake Agassiz. These sloping peatlands are characterized by distinctive central open fen drainways flanked by treed bogs and fens.

Almost 14 000 ha of peatland, at 10 sites, were surveyed in detail (Table 4 and Appendix A) with a measured total volume of 180 100 000 m^3 of peat, 48 percent of which was well humified (von Post H4$^+$) suitable for consideration as potential fuel peat. The deeper portions of these sites (greater than 2 m) had tree cover less than 10 percent varying from 12 percent to 82 percent of the sites.

Numerous other peatlands occur in the Ignace study area. Eighteen of these were surveyed at a reconnaissance level, covering a total of 4730 ha (Table 5). These sites have an estimated total peat volume of 128 100 000 m^3, 49 percent of which was found to be well-humified peat (von Post H4$^+$). Although only limited coring was undertaken on these sites, 15 of them appeared to contain significant peat deposits in excess of 2 m deep, and had average areas of more than 275 ha total peatland.

Overall, the surveyed quantities of peat were highly significant, and suggest almost equal proportions of unhumified peats of interest in terms of horticultural potential and well-humified peats of interest in terms of fuel uses. Seven of the largest sites surveyed in detail had surficial unhumified peat thicker than 95 cm (averaged across the peatland area greater than 2 m deep). Only two of these sites were assigned a large-scale horticultural potential (52G-165 and 52G-226). In the other sites, the average fiber contents, and/or moss contents were lower than the specified limits, e.g., less than 60 percent fiber content and less than 70 percent moss content. These seven sites also satisfied the requirements of category A fuel peat potential as specified in Section 3.4.

Open and treed bogs were the dominant peatland types surveyed (50 percent of peatland surveyed), followed by open and treed fens (32 percent). Peatlands with less than 10 percent tree cover accounted for 37 percent of all surveyed peatlands (Table 6a).

In the Ignace study area as a whole, 12.1 percent of the entire landscape was estimated to be peatland (Table 6b). More than half of the peatland area was classified as conifer or thicket swamp. Of more interest in terms of the peat resources are the deeper and less treed bogs and fens. Almost 47 000 ha of peatland were bog, and 39 000 ha were fen. Ten percent of all peatlands were estimated to be bog and fen which had tree cover of less than 10 percent (18 500 ha).

Based on all the peat cores taken in the study area (1463 cores), the average peat depths for all the peatland types surveyed ranged between 1.8 m and 3.4 m (Table 6c). In terms of average peat depth per peatland type (Table 6d), open bog and treed bog had the greatest average peat depths, 2.7 m and 2.6 m, respectively. These depth figures, derived from averaging peat depths per site (Table 6d), were used to estimate total peat volumes in the Ignace study area (Table 7).

The total estimate of peat occurring in the study area is 3 564 800 000 m^3 of *in situ* peat. Open bogs were estimated to contain 238 000 000 m^3 of peat with an additional 223 500 000 m^3 in open fens. Bogs and fens with tree cover ranging from 10 to 25 percent were estimated to contain a further volume of 1 603 300 000 m^3 of peat. As a result, it is estimated that the total peat volumes occurring in peatlands which are predictably deeper than 2 m are in the order of 2 064 800 000 m^3 of *in situ* peat. The extensive areas of shallower peats occurring under conifer swamp, thicket swamp and marsh contain further peat volumes in the order of 1 500 000 000 m^3.

5.5 ARMSTRONG

The Armstrong study area (Figure 4; 50° to 50°30′N latitude, 88°30′ to 89°30′W longitude) is located to the northwest of Lake Nipigon. From the northwest to the southeast of the study area, the terrain shifts from rugged Shield topography with sandy till ground moraine, containing numerous small peat deposits, to gently undulating sandy glaciolacustrine deposits with almost no peat deposits, and to relatively flat varved silt and clays, adjacent to Lake Nipigon, with few but large peatlands.

Almost 3000 ha of peatland, at six sites, were surveyed in detail (Table 4 and Appendix A) with a measured total volume of 35 500 000 m^3 of *in situ* peat. Twenty percent of the total area surveyed was more than 2 m deep and this area contained almost 19 000 000 m^3 of peat, 15 percent of which was well humified (von Post H4$^+$) suitable for consideration as potential fuel peat. The proportion of these deeper deposits which had tree cover less than 10 percent varied from 20 percent to 100 percent and, on the largest site, the area with tree cover less than 10 percent was 53 percent.

Numerous other peatlands occur in the Armstrong study area. Eight of these were surveyed at a reconnaissance level, covering 638 ha (Table 5). These sites have an estimated total peat volume of 16 400 000 m^3, 39 percent of which was found to be well-humified peat (von Post H4$^+$). Only limited coring was undertaken on these sites, but none of them appeared to have significant peat deposits with areas greater than 150 ha total peatland.

Overall the surveyed quantities of peat were relatively small and suggest a slight predominance of surficial unhumified peat. However, only one site surveyed (52I-46) had more than 150 ha with unhumified peat thicker than 1 m (averaged across the peatland area greater than 2 m deep), but the horticultural value of this site is very limited due to the low moss and fiber contents of its peat.

Treed fen and treed bog were the dominant peatland types surveyed, 42 percent and 35 percent, respectively, of the peatlands surveyed. Peatlands with tree cover less than 10 percent accounted for 24 percent of all the surveyed peatlands (Table 6a).

Across the Armstrong study area as a whole, only 2.8 percent of the entire area was estimated to be peatland (Table 6b). An estimated 4100 ha were conifer swamp and thicket swamp (42 percent of all peatlands). Of more interest in terms of peat resources, the deeper and less treed bogs and fens were estimated to cover 5180 ha. However, only 1050 ha of these were classified as having less than 10 percent tree cover.

Open bog and treed bog were found to occur on the deepest peat deposits in the Armstrong study area (Tables 6c, 6d). Based on all the peat cores taken in the area (302 cores), open bogs had an average peat depth of 2.7 m, and treed bogs had 2.5 m. Fens had average peat depths of 2.0 m. No other peatland types were surveyed significantly in the study area. These figures, and depth figures derived from averaging peat depths per site (Table 6d), were used to estimate total peat volumes in the Armstrong study area (Table 7).

The total volume estimate of peat occurring in the Armstrong study area is 184 300 000 m^3 of *in situ* peat. Open bog and fen are estimated to contain 26 000 000 m^3 of peat. Bogs and fens with tree cover ranging between 10 percent and 25 percent contain an additional 100 000 000 m^3. As a result, it is estimated that the total peat volumes occurring in peatlands which are predictably deeper than 2 m is in the order of 124 800 000 m^3 of *in situ* peat. The extensive areas of shallower peats occurring under conifer and thicket swamp contain further peat volumes in the order of 56 500 000 m^3 of peat.

5.6 LONGLAC–NAKINA

In the Longlac–Nakina study area (Figure 4; 49° to 50°30′N latitude, 86° to 88°W longitude), there are few peatlands in the southern half of the area where the rugged Shield topography typical of the area north of Lake Superior predominates. Peatlands occur mainly north of Geraldton and southwest of the Nakina moraines on glaciolacustrine, outwash and till deposits. These surficial materials have high calcium carbonate contents, which have resulted in a predominance of strongly minerotrophic peatlands throughout the area, with relatively few ombrotrophic bogs.

Over 4600 ha of peatland, at 10 sites, were surveyed in detail (Table 4 and Appendix A) with a measured total volume of 66 300 000 m^3 of *in situ* peat. Thirty-four percent of the total area surveyed was more than 2 m deep, and this area contained over 42 000 000 m^3 of peat, 44 percent of which was well humified (von Post H4$^+$), suitable for consideration as potential fuel peat. The proportion of these deeper deposits which had tree cover less than 10 percent varied from 23 percent to 100 percent, but on the five largest sites (greater than 150 ha with peat greater than 2 m deep) the areas with tree cover less than 10 percent ranged from 57 percent to 100 percent.

Numerous other peatlands occur in the Longlac–Nakina area. Sixteen of these were surveyed at a reconnaissance level, covering a total area of 4470 ha with a total peat volume of 121 800 000 m^3, 51 percent of which was found to be well humified (von Post H4$^+$). Although only limited coring was undertaken on these sites, 10 of them appeared to contain significant peat deposits in excess of 2 m deep, and had average areas of more than 150 ha total peatland.

Overall the surveyed quantities of peat were significant and suggest almost equal proportions of unhumified and well-humified peats. Five of the larger sites surveyed in detail contained surficial unhumified peat thicker than 120 cm (averaged across the peatland area greater than 2 m deep). However, the high pH values (pH 6.0 to 7.0), and in some cases low fiber contents, suggest limited horticultural potential for these sites (for example, site 42L-170).

Open and treed fens were the dominant peatland types surveyed (73 percent of peatland surveyed), followed by conifer swamp (16 percent). Peatlands with tree cover less than 10 percent accounted for 43 percent of all the surveyed peatlands. Thirty-four percent of all surveyed peatlands were classified as open fen (Table 6a).

In the Longlac–Nakina study area as a whole, 8.4 percent of the entire landscape was estimated to be peatland (Table 6b). An estimated 106 337 ha are conifer swamp (53 percent of all peatlands), and another 23 460 ha are thicket swamp (12 percent). Of more interest in terms of peat resources, fen and bog were estimated to cover almost 59 000 ha, and 15 700 ha of these had tree cover less than 10 percent.

The bogs and fens have the greatest peat depth in the study area (Tables 6c, 6d). Based on all the peat cores taken in the study area (756 cores), open and treed bogs had average peat depths of 2.8 m and 2.9 m, respectively, while fens had average peat depth ranging between 2.1 m and 2.4 m. These figures, and depth figures derived from averaging peat depths per site (Table 6d), were used to estimate total peat volumes in the Longlac–Nakina study area (Table 7).

The total volume estimate of peat occurring in the study area is 350 800 000 m^3 of *in situ* peat. Open bogs and open fens are estimated to contain over 420 000 000 m^3 of peat. An additional 950 000 000 m^3 of peat are contained in bogs and fens with tree cover ranging between 10 percent and 25 percent. As a result, it is estimated that the total peat volumes occurring in peatlands which are predictably deeper than 2 m is in the order of 1 385 000 000 m^3 of *in situ* peat. The extensive areas of shallower peats occurring under conifer swamp, thicket swamp and marsh contain further peat volumes in the order of 1 900 000 000 m^3 of peat.

6.0 Peatland Vegetation and Environmental Processes

One of the primary objectives of the inventory was to map and characterize peatland vegetation types, both to provide a descriptive data base for the disposition and management of peatlands, and to enable a predictive extrapolation of site-specific resource data to the region as a whole. A brief description of the major plant communities identified on each of the peatland types is presented in the following text (Section 6.1).

The variability and distinctiveness of the different vegetation communities associated with peatland ecosystems are the result of vegetative responses to edaphic factors, which in turn are largely conditioned by the peat substrates and the hydrological regimes. Data on these environmental processes are presented in Section 6.2.

6.1 PEATLAND VEGETATION TYPES AND SUCCESSIONAL RELATIONSHIPS IN NORTHWESTERN ONTARIO

The following synopsis is based on the sites included in Appendix E (165 sites) and other referred reports, and the classification system of Jeglum et al. (1974) and Appendix C. Common names of the species cited below are listed in Appendix C.

6.1.1 MARSH

DEEP MARSH and SHALLOW MARSH rarely occur on peat, and were not studied by the inventory. The major dominance types include, among others, *Zizania aquatica*, *Typha latifolia*, *Scirpus* spp., *Phragmites communis*, and *Eleocharis palustris*. Where shallow marsh occurs on peat, the dominance types have affinities with fens, dominated by *Carex rostrata*, *C. lasiocarpa*, and other sedges (Photo 5).

MEADOW MARSH usually occurs on peat, and is dominated by *Calamagrostis canadensis* (–*Carex rostrata*–*Scirpus cyperinus*), and *Carex lasiocarpa*. *Carex rostrata* and *Scirpus cyperinus* may also dominate, and frequent associates of these series are often *Calla palustris*, *Potentilla palustris*, *Typha latifolia*, and *Lycopus uniflorus*.

SHRUB-RICH MARSH is frequent along water bodies, usually dominated by *Myrica gale* (–*Betula pumila*), and *Betula pumila* (–*Carex rostrata*–*C. lasiocarpa*). Minor dominance types include *Spiraea alba*, with *Alnus rugosa*, *Chamaedaphne calyculata* and *Salix discolor* frequent species. Shrub-rich marsh often has a location and composition transitional between marsh, thicket swamp and, occasionally, tall-shrub fen (Photo 6).

Photo 5. *In northwestern Ontario, marshes occur most frequently along lakeshores behind beaver dams or along streams. Where stream flow is slow and meandering, the marshes can form complex systems of marsh, meadow marsh and thicket swamp, such as along the Dog River northwest of Thunder Bay.*

Photo 6. *Open tall shrub fens are unusual as far north as on this shoreline peatland along Bruce Lake, where it grades into marsh on its lakeward side and into thicket swamp away from the lake. It is dominated by Betula pumila and Carex aqualis (52K-23).*

6.1.2 SWAMP

THICKET SWAMP occurs on peat and non-peat substrates. The major dominance type observed on peat was *Alnus rugosa* (*–Salix* spp.*–Ledum groenlandicum*), with minor series such as *Cornus stolonifera* (*–Salix* spp.*–Rhamnus alnifolia*), and *Myrica gale* (*–Betula pumila*). *Salix serissima, S. pyrifolia, S. planifolia* and *S. discolor* are common thicket willows. No data on hardwood swamps were collected.

CONIFER SWAMPS were the most common vegetation type but, because of generally shallower peat depths, were not surveyed in detail. On nutrient-rich sites, *Thuja occidentalis* and *Larix laricina* (*–Alnus rugosa–Chamaedaphne calyculata*) dominate, with *Betula pumila* and *Ledum groenlandicum* frequent associate shrubs. On sites dominated by *Picea mariana*, a nutrient-rich and herb-rich series occurs (*Picea mariana–Alnus rugosa* and *Picea mariana–Betula pumila*), as does a more nutrient-poor and herb-poor series (*Picea mariana–Ledum groenlandicum–Chamaedaphne calyculata*).

6.1.3 FEN

OPEN POOL FENS are frequent components of patterned fens, and have strong affinities with graminoid fen types. The major dominance types are *Menyanthes trifoliata–Carex limosa–C. livida*, *Carex limosa* (*–C. chordorrhiza*, *Rhynchospora alba* (*–Cladium mariscoides*), and *Scirpus cespitosus* (*–Carex exilis*). Frequent associates include *Utricularia cornuta, U. intermedia, Xyris montana, Drosera anglica, Equisetum fluviatile,* and *Carex lasiocarpa*.

OPEN GRAMINOID FENS have several major dominance types; *Scirpus cespitosus* (*–Carex exilis*), *Carex lasiocarpa* (*–C. chordorrhiza*), and *Menyanthes trifoliata–Carex limosa–C. livida*. Minor dominance types include *Carex limosa, Scirpus hudsonianus* and *Cladium mariscoides*. The most frequent associate species, at low cover values, are *Utricularia intermedia, Drosera rotundifolia, Sarracenia purpurea, Equisetum fluviatile, Scheuchzeria palustris, Vaccinium oxycoccus, Betula pumila, Andromeda glaucophylla, Chamaedaphne calyculata,* and *Larix laricina*, all with frequencies greater than 70 percent. These are diverse communities with an average of 25 vascular plant species per sample site (5 m radius) (Photo 7).

OPEN SHRUB-RICH FENS include low shrub and tall shrub physiognomic groups, both with similar dominance types. The major series is dominated by *Betula pumila* (*–Andromeda glaucophylla–Chamaedaphne calyculata*, with more minor types including *Myrica gale* (*–Betula pumila*) and the rich calcareous *Potentilla fruticosa* type. Frequent associate species, at low cover values, are *Larix laricina, Ledum groenlandicum, Chamaedaphne calyculata, Vaccinium oxycoccus, Equisetum fluviatile, Salix pedicellaris, Lonicera villosa, Smilacina trifolia, Potentilla palustris* and *Solidago uliginosa*.

The most frequent and dominant bryophytes in open fens were *Sphagnum magellanicum, S. angus-*

Photo 7. *Large open graminoid fens are frequent components of peatlands in northwestern Ontario, such as at the Meinzinger Township peatland (52G-191).*

tifolium, *S. nemoreum*, *Campylium stellatum*, *Scorpidium scorpioides*, *Tomenthypnum nitens*, *Aulocomnium palustre*, and *Pleurozium schreberi*.

OPEN POOR FEN was rarely used as a classification unit in northwestern Ontario. Where it was noted as a shrub-rich phase, the dominance type was *Andromeda glaucophylla–Betula pumila–Chamaedaphne calyculata*. As a graminoid type it was dominated by *Carex oligosperma*. It had the overall appearance of a bog, intermediate surface water pHs (average 5.2, 5.0 to 5.4), but included species usually associated with nutrient-rich sites, such as *Equisetum fluviatile*, *Menyanthes trifoliata* and *Smilacina trifolia*.

TREED GRAMINOID FENS were dominated by *Larix laricina–Carex lasiocarpa* (*–Equisetum fluviatile*), and *Larix laricina–Carex limosa*.

TREED SHRUB-RICH FENS were the most common type of treed fen, with both low shrub and tall shrub units (Photo 8). The major series was *Larix laricina–Betula pumila* (*–Andromeda glaucophylla*). However, more nutrient-poor treed fens also occurred, with dominance types such as *Picea mariana–Chamaedaphne calyculata*, *Picea mariana–Ledum groenlandicum*, and *Picea mariana–Betula pumila*. On occasion, these treed fens graded into TREED POOR FENS, with *Picea mariana–Chamaedaphne calyculata* repeating as a dominance type, along with *Larix laricina–Chamaedaphne calyculata*. The most frequent other associates of these treed fens were *Andromeda glaucophylla*, *Vaccinium oxycoccus*, *Carex paupercula*, *C. chordorrhiza*, *Equisetum fluviatile*, *Sarracenia purpurea*, *Smilacina trifolia*, *Potentilla palustris*, and *Platanthera hyperborea*.

The most frequent and dominant bryophytes in treed fens were *Sphagnum angustifolium*, *S. magellanicum*, *S. fuscum*, *S. fallax*, *S. nemoreum*, *Aulocomnium palustre*, *Pleurozium schreberi*, *Campylium stellatum*, *Dicranum undulatum* and *Polytrichum strictum*.

6.1.4 BOG

OPEN GRAMINOID BOGS, some with relatively sparse graminoid cover, were common. The major dominance type was *Carex oligosperma*, with minor types including *Scheuchzeria palustris–Carex oligosperma*, *Scheuchzeria palustris–Carex pauciflora*, *Carex limosa*, *Eriophorum spissum*, and *Scheuchzeria palustris–Carex paupercula* (Vitt and Bayley 1984).

OPEN SHRUB-RICH BOG, with both low shrub and dwarf shrub phases, was the most common physiognomic group of bogs. The major dominance type was *Chamaedaphne calyculata*, with *Kalmia polifolia–Andromeda glaucophylla* also occurring as a dominance type. The most frequent other associates to these open bog series, at lower cover values, were *Picea mariana*, *Larix laricina*, *Ledum groenlandicum*, *Vaccinium oxycoccus*, *Sarracenia purpurea* and *Drosera rotundifolia*.

The most frequent and dominant bryophyte species in open bogs were *Sphagnum fuscum*, *S. angustifolium*, *S. magellanicum*, *S. rubellum*, *S. nemoreum*, *Polytrichum strictum*, and *Sphagnum fallax*. In some wetter sites, *Sphagnum papillosum* and *S. majus* were important constituents.

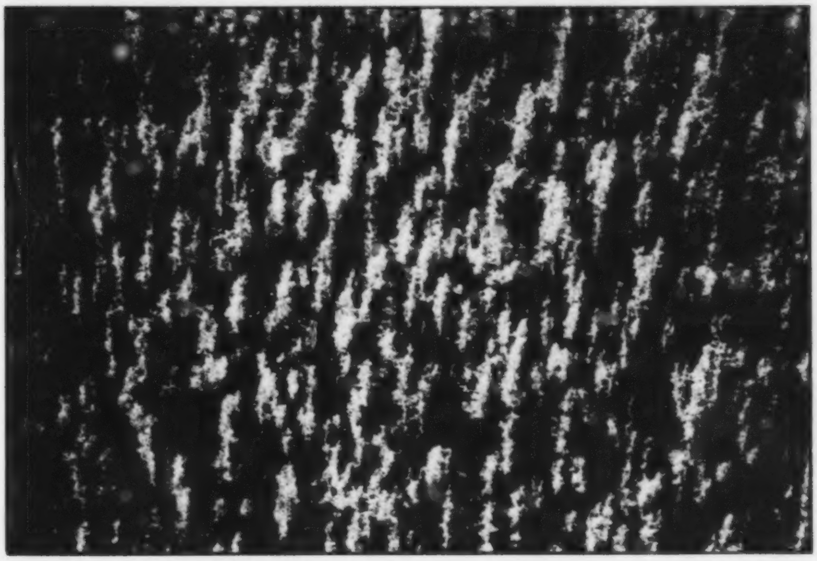


Photo 8. *Characteristically, the treed fens are dominanted by tamarack (Larix laricina) with understorey shrubs such as Betula pumila and Salix pedicellaris. Sphagnum recurvum var. tenue was the dominant ground moss at this site (52F-19) along the Wabigoon River near Vermilion Bay.*

TREED BOGS were very common in northwestern Ontario, especially on the perimeter of open bog peatlands where they can be transitional to nutrient-poor conifer swamp types. Raised bogs of the type common in northeastern Ontario were not observed in the northwest, although large peripheral bog areas are often distinctly raised above the level of fen drainways running through the central portions of peatland complexes.

TREED GRAMINOID BOG was dominated by *Picea mariana–Carex oligosperma* and *Picea mariana–Scheuchzeria palustris*. *Eriophorum spissum* and *Carex pauciflora* were also co-dominant associates on some sites.

TREED LOW SHRUB BOG was the most common treed bog type, the major dominance types being *Picea mariana–Chamaedaphne calyculata* and *Picea mariana–Ledum groenlandicum*. The most frequent associates of these sites, at lower cover values, were *Kalmia polifolia*, *Vaccinium oxycoccus*, *Eriophorum spissum*, and *Smilacina trifolia*, all with frequencies over 70 percent.

The most frequent and dominant bryophyte species in treed bogs were *Sphagnum fuscum*, *S. angustifolium*, *S. magellanicum*, *Pleurozium schreberi*, *Polytrichum strictum* and *Dicranum undulatum*.

6.2 ENVIRONMENTAL AND PHYSIOGNOMIC CHARACTERISTICS

A relatively limited data set on the environmental and physiognomic characteristics of the peatland vegetation types is presented to provide some descriptive measures of the variability and distinctiveness of the various vegetation communities. Within the almost continuous gradient of vegetation ecosystems occurring on peatlands, the classification system recognizes the most predictably recurring types, and some individual sites may be considered transitional between types.

A limited number of surface water samples (10 to 15 cm below water table) were recovered for element determination using ICAP spectrometry (Ca, Fe, Mg, Mn, Cu, Zn) (Table 8), after filtering samples through Whatman 40 Ashless filters. Based on the data on Table 8 and the average pHs of those water samples in the field, strong positive correlations were found between element concentration and water pH in the case of Ca ($r = +0.87$) and Mg ($r = +0.99$). Few data were collected, but a strong negative correlation was found in the case of Cu ($r = -0.95$). Mn and Fe were found to be positively correlated with surface water pHs measured, although a more complete data set from northeastern Ontario suggested negative correlation in that region. The correlation coefficient values themselves may be high because they correlate mean, rather than individual data.

The peatland classification units have characteristic mean values for physiognomic canopy strata (Table 9), which reflect in large part the arbitrary cover distinctions used in the classification keys (Appendix C). However, they also illustrate the relative biomass productivity of these types, decreasing in total cover values from treed to open associations.

TABLE 8. MINOR ELEMENT COMPOSITION OF SURFACE WATERS OF NORTHWESTERN ONTARIO PEATLANDS.

Peatland Type	No. of Samples	Ca, ppm	Fe, ppm	Mg, ppm	Mn, ppm	Cu, ppm	Zn, ppm
Marsh	n.d.						
Thicket Swamp	1	1.8	0.95	0.37	0.04	0.02	0.02
Conifer Swamp	n.d.						
Open Fen	17	<4.7±4.3, <1.0-19.0	<1.25±1.37, <0.07-4.58	1.31±1.75, 0.22-7.51	0.05± 0.05, 0.004-0.18	<0.009±0.004, <0.004-0.020	<0.02±0.02, <0.01-0.07
Treed Fen	9	10.1±10.6, 3.2-32.1	<1.44±2.09, <0.07-5.98	1.31±0.54, 0.62-2.60	0.15±0.37, 0.006-1.13	0.011±0.006, 0.004-0.020	<0.04±0.07, <0.01-0.22
Open Bog	16	<1.4±0.4, <1.0-2.3	0.68±0.43, 0.30-1.56	0.29±0.14, 0.12-0.56	0.07±0.04, 0.02-0.17	0.015±0.009, 0.005-0.040	0.02±0.07, 0.01-0.03
Treed Bog	11	<1.5±0.8, <1.0-3.23	0.48±0.32, 0.16-1.31	0.33±0.29, 0.13-1.10	0.07±0.07, 0.01-0.28	0.016±0.005, 0.010-0.020	0.02±0.01, 0.01-0.03
ICAP Detection Limit		1.0 ppm	0.07 ppm	0.12 ppm	0.003 ppm	0.004 ppm	0.01 ppm

n.d. - no data

All values in ppm; values are Mean Values ± 1 x Standard Deviation, followed by range of values. Note that Pb and Al values were all below ICAP detection limits (0.4 and 0.25 ppm, respectively).

Within particular physiognomic groups, there is a slight decrease in above-ground cover values from fen to bog. The latter decrease is also apparent in the average number of vascular plant species occurring in these systems.

The highest values of surface water pH (an index of nutrient availability) were observed in marshes (5.6 to 7.0, average 6.0) and treed fens (5.2 to 6.2, average 5.6). Thicket swamps and conifer swamps were undersampled but the data show intermediate values (thicket swamp 5.0 to 5.7, average 5.4; conifer swamp 4.5 to 5.4, average 5.0). Open fens also had relatively high values of surface water pH (4.8 to 6.5, average 5.5). The treed bogs (3.8 to 5.3, average 4.5) and open bogs (3.8 to 5.1, average 4.6) were distinctly more acidic.

The average depth-to-water for the various formations may be viewed as a rough measure of the moisture-aeration regime of particular sites (Jeglum 1974); it also varied in a similar manner. Marshes were the wettest sites, with an average depth-to-water of 4 cm (-11 to +12); fens had an average depth-to-water of 14 cm (-13 to +40); and bogs (average 25 cm, 3 to 66) and swamps (average 26 cm, 4 to 43) were the driest types. Considerable variation also occurred within the bog and fen formations, with the open pool and graminoid phases being much wetter (i.e., lower average depth-to-water values) than the shrub-rich or the treed phases.

The relationship between surface water pH and average depth-to-water was plotted for these major formations (Figure 5) to illustrate the general relationships between these vegetation types. In terms of overall vegetation succession, the principal temporal parameter affecting these peatland systems is peat accumulation. This operates as a strong unidirectional factor in most peatland successional scenarios, because net accumulation exceeds decomposition even in situations where the rate of net accumulation may be low, e.g., in some swamps.

For northwestern Ontario, Table 6c indicates the average peat depths found under these peatland types during the course of the inventory (5542 individual measurements). The average peat depths vary in relation to vegetation type in the same pattern as indicated above: marsh, 1.4 m (n=211); thicket swamp, 1.8 m (n=78); open fen, 2.3 m (n=1122); treed fen, 2.3 m (n=748); treed bog, 2.7 m (n=1616); open bog, 2.8 m (n=1314). (All of these values are generally high in the Ontario context because the exceptionally deep peat values of the Rainy River study area skew these values significantly. Reference should be made to Table 6c for calculations of these depth values including and excluding Rainy River data. For example, the average peat depth found under conifer swamps in the Rainy River area was 3.2 m (n=243), while it was only 2.1 m (n=69) in the other northwestern Ontario study sites.)

The strong correlations between surface water pH, average depths-to-water, peat depths and surface water Ca values suggest consistent environmental partitioning of these types, independent of the distinct differences in species composition and coverage between these types. These data suggest certain successional scenarios as probable on peatlands over a long period of time. These trends and the rates of change would necessarily be modified by particular hydrological regimes or by anthropogenic

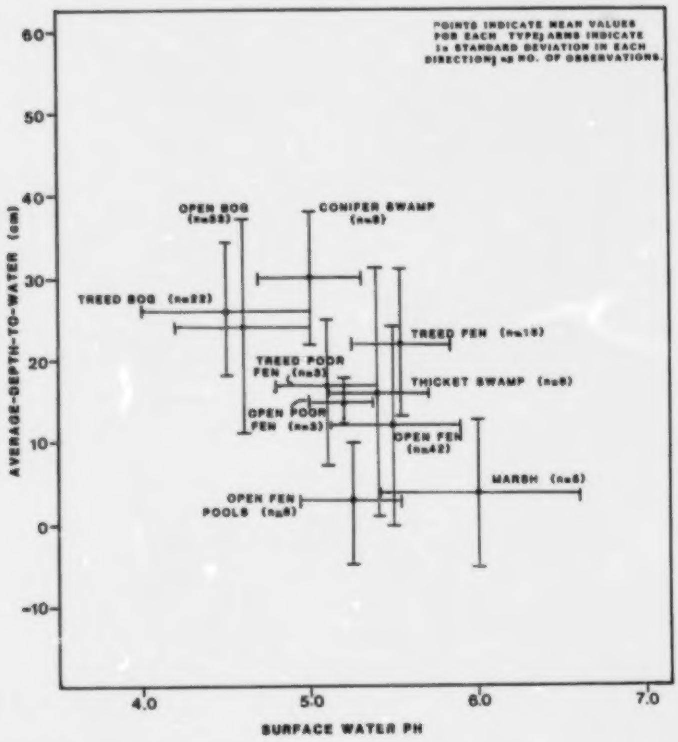


Figure 5. *Relationships of surface water pH and average depth-to-water for major peatland vegetation types.*

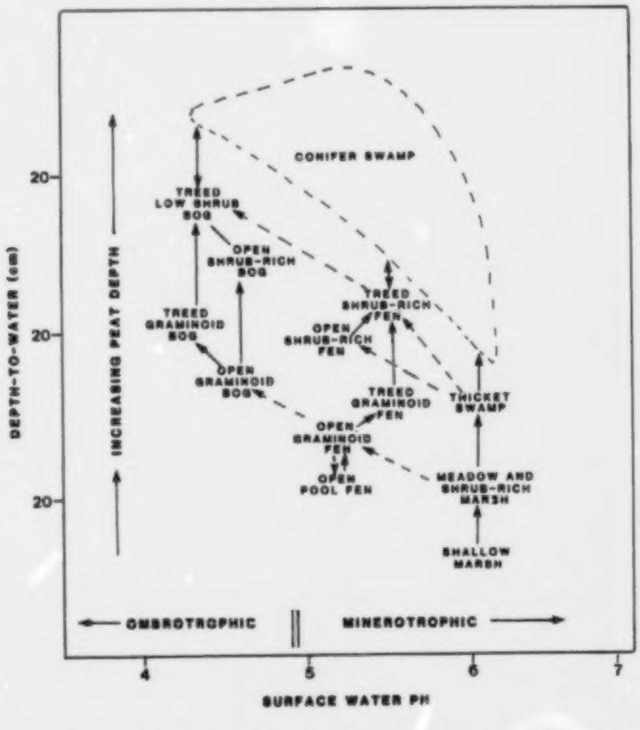

CONIFER SWAMP
TREED LOW SHRUB BOG
OPEN SHRUB-RICH BOG
TREED GRAMINOID BOG
OPEN GRAMINOID BOG
TREED SHRUB-RICH FEN
OPEN SHRUB-RICH FEN
TREED GRAMINOID FEN
OPEN GRAMINOID FEN
OPEN POOL FEN
THICKET SWAMP
MEADOW AND SHRUB-RICH MARSH
SHALLOW MARSH
INCREASING PEAT DEPTH
DEPTH-TO-WATER (cm)
20
20
20
OMBROTROPHIC
MINEROTROPHIC
4
5
6
7
SURFACE WATER PH

Figure 6. *Schematic of apparent successional relationships between major peatland types. Major trends are indicated with unbroken arrows, less major relationships are indicated with broken arrows.*

TABLE 9. PHYSIOGNOMIC AND ENVIRONMENTAL CHARACTERISTICS OF PEATLAND CLASSIFICATION UNITS, NORTHWESTERN ONTARIO.

Classification Units	No. of Sample Sites	Surface Water pH (x±sd, Range)	Average Depth-to-Water (cm) (x±sd, Range)	Peat Depth (cm) (x±sd, Range)	Tree Cover >150 cm (%) (x±sd, Range)	Shrub Cover >150 cm (%) (x±sd, Range)	Shrub, tree spp. Cover >150 cm (%) (x±sd, Range)	Graminoid/ Herb Cover (%) (x±sd, Range)	Bryophyte/ Lichen Cover (%) (x±sd, Range)	Average No. Vascular Plant Species (x±sd, Range)
MARSH	5	6.0±0.6, 5.6-7.0	4±9, -10-+12	170±170, 40-440	+	9±13, 0-31	10±13, 0-30	63±24 50-110	32±37, 0-80	21±6, 16-31
Shrub-rich MARSH	2	5.8±0.1, 5.7-5.9	12±1, 11-12	260±255, 80-440	1, 0-3	17, 4-31	17, 5-30	53, 50-55	73, 65-80	25, 22-31
Meadow MARSH	4	6.0±0.7, 5.6-7.0	3±9, -10-+10	103±87, 40-230	0,	3±3, 0-6	5±9, 0-15	70±35, 50-110	5±9, 0-15	17±1, 16-18
Thicket SWAMP	6	5.4±0.3, 5.0-5.7	16±15, 4-43	193±127, 40-360	7±7, 0-20	35±18, 15-65	29±24, 4-60	50±23, 11-75	68±21, 40-95	30±6, 23-36
Conifer SWAMP*	9	5.0±0.3, 4.5-5.4	30±8 18-43	100±78 40-240	51±21, 25-80	8±13, 0-40	26±22, 6-70	17±12, 1-32	88±9, 70-99	19±7, 8-30
(Cedar, tamarack dominant	4	5.1±0.1, 5.0-5.2	30±7, 24-38	138±97, 40-240	45±17, 33-71	3±3, 0-7	17±18, 6-44	13±14, 1-25	88±7 80-95	18±8, 8-25)
(Black spruce dominant	5	5.0±0.4, 4.5-5.3	29±9, 18-43	70±42, 40-130	56±24, 25-80	13±16, 0-40	34±24, 12-70	20±11, 5-32	88±11, 70-99	20±7, 14-30)
OPEN FEN	48	5.5±0.4, 4.8-6.5	11±12, -13-+40	291±151, 40-800						
OPEN Poor FEN	6	5.3±0.3, 4.8-5.7	3±8, -4-+20	324±117, 160-430	0	0	+	39±8, 25-47	45±20, 30-80	15±5, 10-22
OPEN Graminoid FEN	30	5.5±0.3, 4.9-6.3	8±10, -13-+35	318±167, 40-800	2±2, 0-5	0	11±6, 3-20	49±18, 21-91	73±24, 16-99	25±7, 11-41
OPEN Shrub-rich FEN	12	5.5±0.4, 4.9-6.5	21±11, 7-40	208±89, 50-310	3±3, 0-9	4±12, 0-40	38±18, 18-76	18±5, 12-29	87±11, 60-99	24±10, 15-41
OPEN Low Shrub FEN	11	5.5±0.4, 4.9-6.5	20±10, 7-40	210±93, 50-310	3±3, 0-9	+	39±19, 18-76	18±5, 12-29	86±11, 60-95	25±10, 15-41
OPEN Tall Shrub FEN	1	5.6	34	176	0	40	35	20	99	15
OPEN POOR FEN*	3	5.2±0.2, 5.0-5.4	15±3, 10-18	267±47, 230-320						
TREED FEN	16	5.6±0.3, 5.2-6.2	22±9, 12-40	240±135, 70-600						
TREED Graminoid FEN	5	5.4±0.2, 5.2-5.8	15±3, 12-19	239±147, 70-390	11±1, 10-12	+	16±5, 8-23	42±16, 27-68	86±20, 50-99	19±8, 14-32
TREED Shrub-rich FEN	11	5.6±0.3, 5.3-6.2	22±10, 12-40	241±137, 70-600	18±8, 10-36	7±12, 0-33	28±10, 15-50	21±11, 6-35	90±11, 60-99	25±7, 14-37

TABLE 9. CONTINUED.

Classification Units	No. of Sample Sites	Surface Water pH (x±sd, Range)	Average Depth-to-Water (cm) (x±sd, Range)	Peat Depth (cm) (x±sd, Range)	Tree Cover >150 cm (%) (x±sd, Range)	Shrub Cover >150 cm (%) (x±sd, Range)	Shrub, tree spp. Cover >150 cm (%) (x±sd, Range)	Graminoid/ Herb Cover (%) (x±sd, Range)	Bryophyte/ Lichen Cover (%) (x±sd, Range)	Average No. Vascular Plant Species (x±sd, Range)
TREED Low Shrub FEN	8	5.6±0.3 5.3-6.2	24±10, 12-40	260±160, 70-600	15±6, 10-25	+	29±10, 18-50	21±11, 6-35	90±12, 60-97	26+5, 20-37
TREED Tall Shrub FEN	3	5.6±0.2, 5.4-5.7	28±5, 23-33	193±12, 180-200	27±9, 19-36	24±8, 20-33	26±11, 15-37	19±12, 6-29	92±10, 80-99	24±11 14-36
(Low Density TREED Fen	9	5.5±0.3, 5.2-6.2	20±9, 12-40	267±164, 70-600	11±1, 10-12	+	22±12, 8-50	32±18, 8-68	89±15, 50-99	23±8, 14-37)
(Medium Density TREED FEN	4	5.6±0.3, 5.2-5.8	20±7, 12-27	245±85, 180-370	18±2, 16-20	5±10, 0-20	24±9, 15-36	23±12, 6-35	86±17, 60-97	24+4, 21-37)
(High Density TREED FEN	3	5.6±0.2 5.4-5.7	33±5, 28-37	157±75, 70-200	29±6, 25-36	18±16 2-33	31±6, 25-37	19±12, 6-29	92±10, 80-99	23±9, 14-36)
TREED POOR FEN*	3	5.1±0.3, 4.9-5.4	17±8, 10-25	248±112, 120-325	10±2, 8-12	0	21±6, 15-26	33±14, 23-49	96±5, 90-99	15±3, 12-18
OPEN BOG	53	4.6±0.4, 3.8-5.1	24±13, 3-66	317±162, 40-650						
OPEN Graminoid BOG	32	4.6±0.4, 3.8-5.1	17±7, 3-33	306±188, 40-620	3±2, 0-8	+	16±8, 5-29	35±13, 16-63	98±1,	11±2 7-15
OPEN Shrub-rich BOG	21	4.6±0.4 3.9-5.0	35±13, 17-66	316±130, 150-650	3±3, 0-8	0	41±15, 18-72	10±7, 1-33	99±1,	11±2, 6-14
OPEN Dwarf Shrub BOG	9	4.7±0.3, 4.1-5.0	36±14, 20-66	324±99, 180-500	1±0.7, 0-2	0	42±17, 21-72	12±10, 1-33	98±1	11±3, 6-14
OPEN Low Shrub BOG	12	4.5±0.5 3.9-5.0	35±12, 17-53	311±153, 150-650	4±3, +-8	0	40±14, 18-70	9±4, 4-15	99±1	11±2, 8-14
TREED BOG	22	4.5±0.5, 3.8-5.3	26±8, 14-39	288±128 40-520						
TREED Graminoid BOG	7	4.5±0.3, 4.2-5.1	23±6, 14-32	212±120 40-340	14±3, 11-20	+	16±6, 9-23	25±10, 15-42	99	11±3, 6-14
TREED Low Shrub BOG	15	4.5±0.5 3.8-5.3	28±8, 17-39	323±119 110-520	18±8, 10-33	+	34±15, 22-70	12±8, 2-33	98±1	12±3, 7-17
(Low Density TREED BOG	10	4.2±0.4, 3.8-5.1	25±12, 18-39	292±159, 40-520	11±1, 10-13	0	34±17 9-70	15±10, 2-33	98±1	11±2, 7-14)
(Medium Density TREED BOG	9	4.7±0.4, 4.1-5.3	26±8, 14-34	273±100, 145-430	18±3, 14-20	+	26±12, 9-44	19±12, 6-42	99	12±4, 6-17)
(High Density TREED BOG	3	4.8±0.2, 4.7-5.1	27±8, 19-35	318±123, 180-415	30±4, 25-33	0	28±6, 24-34	15±11, 8-27	98±2,	11±3, 8-16)

• Not subdivided in this table due to small number of samples.   *+ Indicates x<0.5%.*

Based only on those samples sites presented in the phytosociological analysis (Appendix E). Values are reported as means (x), ± 1 x standard deviation (sd), followed by the range of values averaged.

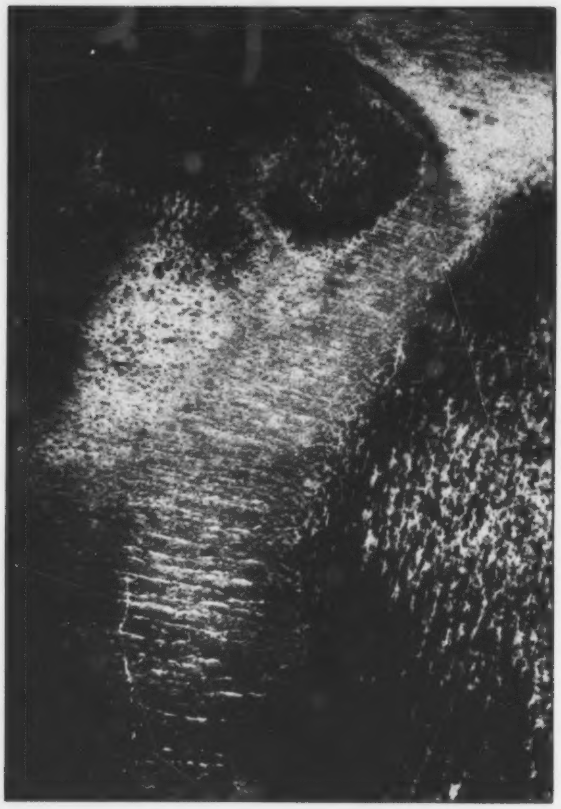


Photo 9. *The patterning peatland types are usually complex on large sites in northwestern Ontario. Most frequently encountered are sloping peatlands in which elongate "string fen" drainways occupy the central peatland and treed or open bogs occur on the periphery of sites (52J-15).*

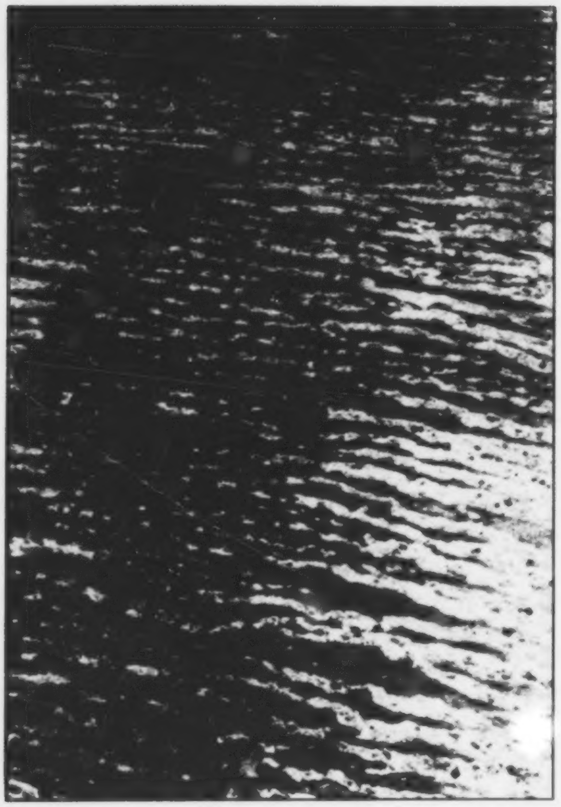


Photo 10. *The characteristic patterning of open, sloping fen peatlands, such as the Adair Lake, is this type of alternating, ribbed or "string" pattern of pools and ridges. Water movement is perpendicular to the ridges (52F-113D).*

changes to the major environmental parameters. This assessment of successional trends is also based on sites interpreted as transitional; for example, sites in which the average depth-to-water has been increased by road construction shift towards more rigorous tree and shrub growth because of the enhanced root aeration regime, and vice versa.

The major successional relationships are presented schematically in Figure 6 which suggests that, given a stable hydrological and climatic regime, and a long enough period of organic accumulation, the major successional trends are from wetter to effectively drier conditions (i.e., increasing average depths-to-water) and from minerotrophic to ombrotrophic conditions, both of which can occur at the same time as a progressive paludification of the landscape occurs. This may be viewed as a general succession towards bog and swamp ecosystems.

On a site specific basis, this scenario is often apparent in the stratigraphy of sites as interpreted from the peat type profiles of specific sites, but deserves closer site specific study in terms of both macrofossils and pollen assemblages.

On the large peatlands of northwestern Ontario, especially on the sloping, more or less channelized peatlands immediately adjacent to the end moraine systems running across the region, complex patterns of various peatland types are frequent. These patterns are expressive of complex hydrological regimes, and often consist of central, sloping patterned fens with peripheral bog areas through which water flow is much less significant (Photos 9, 10).

7.0 Physical and Chemical Characteristics of Peat in Northwestern Ontario

The characteristics of the peat, as well as their spatial and stratigraphic distribution, are critical to the attribution of specific peat resource potential to specific peatlands. As part of the peatland inventory, 650 samples from 131 stratigraphic cores were tested for their physical and chemical properties (Section 3.5; Riley 1989a). The cores were selected by field teams to represent the typical stratigraphy of peatlands surveyed in detail. The following description of these results emphasizes the overall regional characteristics of the peat analyzed in terms of different potential uses, specifically for energy and horticultural purposes. The full data set, for site-specific evaluation, is presented in Appendix B.

In addition, peat profiles representative of the major peatland types surveyed in the region, are presented in Figure 7. They illustrate the typical peat stratigraphy of the peatland types, and the distribution of elements within the profiles.

7.1 FUEL-GRADE PEAT

As discussed previously, fuel-grade peat in Ontario can be generally defined as organic material having more than 4165 cal/g net heating value, and less than 25 percent ash content. As a general rule-of-thumb, fuel-grade peats were considered in the field and in the summary tables of this report to have a humification value of H4 or more on the von Post scale (Appendix A).

In northwestern Ontario, 256 of the peat samples analyzed had the above properties. The results of these tests follow:

	Mean	Standard Deviation	Range
Net heating value (cal/g)	4685	±260,	4171 - 5547
Volatile matter (%)	67.4	± 4.9,	32.0 - 86.5
Moisture content (% wet)	88	± 3,	73 - 95
Dry bulk density (g/cc)	0.12	± 0.03,	0.05 - 0.28
Wet bulk density (g/cc)	1.04	± 0.03,	0.96 - 1.12
Ash content (%)	7.6	± 3.4,	1.5 - 19.7
Total carbon (%)	52.1	± 2.7,	43.0 - 61.8
Hydrogen (%)	5.4	± 0.4,	3.8 - 6.3
Sulphur (%)	0.19	± 0.20,	0.01 - 1.30
Humification (von Post scale)	4.6	± 1.0,	4.0 - 8.0
Percentage moss peat	63	± 32	
Percentage sedge peat	31	± 31	
Percentage woody peat	6	± 11	

Trace elements which may be problematic as eventual emissions from combustion plants were also analyzed. They are equivalent to or less than those found in Finnish fuel peats, for which the resultant emission levels are documented (Hasanen 1982), with the exception of manganese levels, which are considerably higher than in Finnish fuel peats.

	Mean	Standard Deviation	Range
Arsenic (ppm)	< 0.42	± 0.92,	<0.10- 8.80
Mercury (ppm)	< 0.04	± 0.04,	<0.01- 0.45
Lead (ppm)	< 4.8	± 6.4,	<2.0 - 73.0
Zinc (ppm)	<14.5	± 22.4,	<1.0 -170.0
Manganese (ppm)	<82.9	±243.1,	<2.0 -3545

On an operational basis, peat materials which are less humified (i.e., H1-3) can also be considered potential fuel peats if their net heating value is sufficiently high. In these cases, the bulk densities of the peat may be less attractive in terms of materials handling but still economically viable. Seventy-one percent of all the peat samples (463) qualified as fuel-grade peat on the basis of having greater than 4165 net cal/g and ash contents less than 25 percent. The following results indicate that these peats differ very little from the above reported values.

	Mean	Standard Deviation	Range
Net heating value (cal/g)	4650	±269 ,	4168 -5547
Volatile matter (%)	69.5	± 5.6,	32.0 - 86.5
Moisture content (% wet)	89	± 3,	73 - 96
Dry bulk density (g/cc)	0.11	± 0.03,	0.04- 0.28
Wet bulk density (g/cc)	1.04	± 0.04,	0.92- 1.33
Ash content (%)	6.8	± 3.2,	1.2 - 19.7
Total Carbon (%)	51.5	± 3.0,	38.6 - 61.8
Hydrogen (%)	5.3	± 0.5,	3.8 - 6.3
Sulphur (%)	0.18	± 0.19,	0.01- 1.30
Humification (von Post scale)	3.7	± 1.3,	1 - 8
Percentage moss peat	67	± 30	
Percentage sedge peat	28	± 29	
Percentage woody peat	5	± 10	

Trace elements increase slightly because of inclusion of a greater proportion of surficial peats.

7.2 HORTICULTURAL-GRADE PEAT

In general, the requirements for horticultural-grade peat materials are for fibrous organic materials which are resistant to rapid decomposition (i.e., sphagnum moss peats), with high cation exchange capacities and high absorptive capacity. A total of 205 peat samples collected in northwestern Ontario had a humification level of H1-3 (von Post scale) and were reported to contain more than 70 percent moss peat (including some brown moss peats as well as sphagnum peats). The following were the results in terms of some parameters of horticultural interest.

	Mean	Standard Deviation	Range
Cation exchange capacity (meq/100g)	163	± 67,	9 -362
Peat pH (in H_2O)	5.0	± 1.1,	35 - 7.3
Peat pH (in $CaCl_2$)	4.3	± 1.2,	2.7 - 7.3
Conductivity (umhos/cm)	62	± 73,	5 -789
Fiber content (% fibers >0.15 mm)	70	± 20,	25 -112
Moisture content (%)	91	± 3.3,	77 - 96
Dry bulk density (g/cc)	0.10	± 0.04,	0.04- 0.32
Absorptive Capacity	20.1	± 8.1,	6.5 -43.4
Ash content (%)	6.3	± 3.5,	1.2 -21.9
Nitrogen (%)	1.7	± 0.9,	0.4 - 6.3
Phosphorus (ppm)	562	± 229,	40 -1540
Potassium (ppm)	1330	± 914,	94 -4530
Calcium (ppm)	10399	± 10228,	700 -50500
Humification (von Post scale)	2.3	± 0.9,	1.0 - 3.0
Percentage moss peat	88	± 10	
Percentage sedge peat	8	± 9	
Percentage woody peat	4	± 7	

If one includes all peat samples with moss content reported as more than 70 percent and a von Post humification of H1-4, the results indicate that the inclusion of H4 peat results in a decrease in the horticultural quality of the peat in terms of peat pH, fiber content and absorptive capacity. However, horticultural peat producers often use H4 peats where necessary, and the characteristics of all H1-4 peats (n=334) with more than 70 percent moss content are reported below.

	Mean	Standard Deviation	Range
Cation exchange capacity (meq/100g)	164	± 68,	9 -420
Peat pH (in H_2O)	5.2	± 1.0,	3.5 - 7.4
Peat pH (in $CaCl_2$)	4.4	± 1.2,	2.7 - 7.4
Conductivity (umhos/cm)	58	± 67,	5 -789
Fiber content (% fibers >0.15 mm)	63	± 20,	19 -112
Moisture content (%)	90	± 3,	73 - 96
Dry bulk density (g/cc)	0.11	± 0.04,	0.04- 0.320
Absorptive Capacity	17.5	± 7.7,	5.6 -43.4
Ash content (%)	6.6	± 3.5,	1.2 -21.9
Nitrogen (%)	1.8	± 0.8,	0.4 - 7.1
Phosphorus (ppm)	508	± 208,	40 -1540
Potassium (ppm)	1160	±1075,	83 -8729
Calcium (ppm)	13248	±12676,	700 -69380
Humification (von Post scale)	3.0	± 1.1,	1.0 - 4.0
Percentage moss peat	87	± 10	
Percentage sedge peat	9	± 10	
Percentage woody peat	4	± 7	

7.3 SEDGE PEATS

Poorly decomposed sedge peats ("reed-sedge peats") are widely marketed for horticultural purposes in the United States, and may have limited local usefulness. In comparison with moss peats, the absorptive capacity and fiber contents are less suitable for horticultural uses, and in terms of energy potential, the trace elements are slightly less attractive than in the more common moss-dominated peats. The following values are relevant, however, to consideraion of how much of the peat type composition of a prospective horticultural peat deposit can be sedge or herbaceous peat without compromising the peat's horticultural usefulness. The following values (n=45) are for peats with greater than 50 percent sedge composition, von Post humification levels of H1-3, and ash content of less than 25 percent.

	Mean	Standard Deviation	Range
Cation exchange capacity (meq/100g)	125	± 64,	50 -353
Peat pH (in H_2O)	4.9	± 0.8,	3.6 - 6.8
Peat pH (in $CaCl_2$)	4.1	± 0.8,	2.7 - 6.0
Conductivity (umhos/cm)	46	± 39,	9 -198
Fiber content (% fibers >0.15 mm)	52	± 15,	22 - 93
Moisture content (%)	89	± 4,	76 - 94
Dry bulk density (g/cc)	0.11	± 0.04,	0.06- 0.23
Total Carbon (%)	52.2	± 3.6,	41.0 -58.6
Net heating value (cal/g)	4752	± 257,	4036 -5126
Volatile matter (%)	70.0	± 3.9,	60.8 -82.6
Absorptive Capacity	15.1	± 5.2,	5.8 -34.3
Ash content (%)	6.9	± 3.2,	2.4 -16.1
Hydrogen (%)	5.5	± 0.4,	3.9 - 6.1
Nitrogen (%)	2.2	± 0.6,	1.0 - 4.2
Phosphorus (ppm)	508	± 260,	189 -1615
Potassium (ppm)	936	± 685,	200 -3200
Calcium (ppm)	7678	±5928,	1317 -24691
Arsenic (ppm)	<0.5	± 1.3,	<0.1 - 8.1
Mercury (ppm)	<0.07	± 0.05,	<0.01- 0.26
Lead (ppm)	<13	± 25,	<2 -110
Zinc (ppm)	26	± 30,	3 -135
Manganese (ppm)	92	± 148,	5 -930
Humification (von Post scale)	2.9	± 0.3,	2 -3
Percentage moss peat	26	± 14	
Percentage sedge peat	69	± 15	
Percentage woody peat	5	± 10	

7.4 BROWN MOSS PEATS

Although reported elsewhere in North America as being commonly produced in large quantities for horticultural purposes, brown moss peat was only encountered sporadically in northwestern Ontario, almost always as thin strata (less than 5 to 10 cm) in the bottom third of the peat profile. For the purposes of this report, these fibric, unhumified lenses of brown moss peat (usually H3) have been included with the other moss peats.

7.5 VARIABILITY RELATED TO PEAT HUMIFICATION

The peatland inventory's field studies relied on field determination of peat humification by the von Post scale. These degrees of humification were the basis of transect profiles of humification levels, and calculations of volumes of peat in deposits. On the basis of laboratory results, the following are the general characteristics of each degree of humification (von Post scale) in northwestern Ontario, reported as mean values (Table 10).

These data suggest that the range of test values associated with peat humification were consistently represented through the use of the von Post scale, especially in the critical H1-5 range. The greater variations in the H6-8 range are due probably to the limited samples analyzed, and to more difficult field determinations of the degree of humification.

7.6 SCHEMATIC PEAT PROFILES FOR MAJOR PEATLAND TYPES

The laboratory results from the 131 peat cores from northwestern Ontario (650 physical samples; Appendix B) document typical peat profiles under a number of distinctive and easily recognizable peatland types: 36 profiles under open bog; 31 under treed bog; 43 under open fen and poor fen; 10 under treed fen and poor fen; 6 under conifer swamp; 1 under thicket swamp; and 4 under marsh/meadow marsh. These data have been integrated to provide schematic peat profiles under each of these types (Figure 7) to illustrate the typical peat stratigraphy found in northwestern Ontario and the stratigraphic sequestering of elements within the profiles.

TABLE 10. PEAT CHARACTERISTICS OF VON POST HUMIFICATION DEGREES, NORTHWESTERN ONTARIO.

	H1 (n=61)	H2 (n=44)	H3 (n=192)	H4 (n=192)	H5 (n=81)	H6 (n=30)	H7 (n=11)	H8 (n=8)
Ash content (%)	7.7	6.7	6.2	7.6	9.2	9.3	11.1	11.7
Net heating value (cal/g)	4128	4284	4608	4623	4605	4579	4428	4531
Dry Bulk density (g/cc)	0.11	0.10	0.10	0.12	0.12	0.13	0.14	0.12
Volatile matter (%)	74.7	72.9	70.8	67.3	65.9	66.0	61.9	66.3
Total Carbon (%)	47.5	47.4	51.1	51.8	51.3	51.9	49.4	52.0
Fiber content (%)	82.6	73.5	59.2	51.3	48.8	51.9	50.4	58.0
Cation Exchange Capacity (meq/100 cm)	147	152	157	152	155	144	171	167
Absorptive capacity	22.2	20.6	16.8	13.7	12.7	12.5	12.2	13.5
Peat pH (H_2O)	5.1	5.2	4.9	5.3	5.5	5.4	5.3	5.5

TYPICAL PEAT PROFILE - OPEN BOG - NORTHWESTERN ONTARIO
(Reported values are means,± standard deviations,n represents the number of values averaged)

Vegetation physiognomy:
Tree cover 3.8±2.7
Tall shrub cover (%).24±.80
Low shrub cover (%) 31.8±21.9
Depth to water table (cm) 24.2 ± 13.0
Herbaceceous/graminoid cover (%) 19.4±14.9
Moss cover (%) 94.8±6.7
Surface water pH 4.3±.42
(10-15cm below water table)

	Midpoint (cm)	Humification	Estimated Peat Type				pH (H20)	Cation Exchange Capacity (meq/100g)	Conductivity (umhos/cm)	Fiber Content (%)	Absorptive Capacity	Ash Content (%)	Calorific Value (cal/g)	Bulk Density (dry,g/cc)	Carbon (total %)
			%Moss	%Sedge	%Woody	%Other									
	9.5	1.1±.3 N=14	94	5	1	0	4.2	140±37 n=15	29.5±15.6 n=15	87±11 n=15	28.2±7.3 n=15	5.4±2.4 n=14	4261±101 n=15	.08±.04 n=15	47.7±1.7 n=15
1st Quartile	43	3±.7 N=53	81	16	3	0	4.2	177±75 n=53	46.7±43.9 n=47	72±22 n=51	22.5±8.2 n=53	4.8±1.9 n=53	4535±367 n=52	.09±.03 n=53	49.6±3.3 n=53
2nd Quartile	124	4±.8 N=38	72	24	4	0	4.5	157±68 n=37	23.8±17.1 n=36	55±13 n=38	16.6±6.0 n=38	4.4±2.3 n=38	4802±232 n=38	.10±.02 n=38	52.6±2.9 n=38
3rd Quartile	230.5	4.1±.9 N=40	63	32	6	0	4.9	171±81 n=40	31.4±14.7 n=40	55±14 n=40	15.5±4.6 n=40	5.3±2.1 n=40	4822±218 n=40	.11±.03 n=40	52.4±2.5 n=40
4th Quartile	308.5	4.4±1.3 N=43	58	37	4	0	5.1	138±60 n=44	46.0±27.1 n=44	51±14 n=44	13.7±4.2 n=44	9.6±4.5 n=44	4616±308 n=44	.12±.03 n=44	50.6±3.5 n=44
25-60% Ash	362.5	-	30	20	0	50	5.5	100±57 n=9	52.7±24.5 n=8	45±22 n=8	10.6±3.1 n=8	34.1±10.3 n=10	3397±587 n=10	.16±.08 n=8	36.4±4.7 n=9
> 60% Ash	428	-	-	-	-	-	-	11.0 n=1	-	-	-	86.3±9.1 n=2	-	-	8.7±5.2 n=2

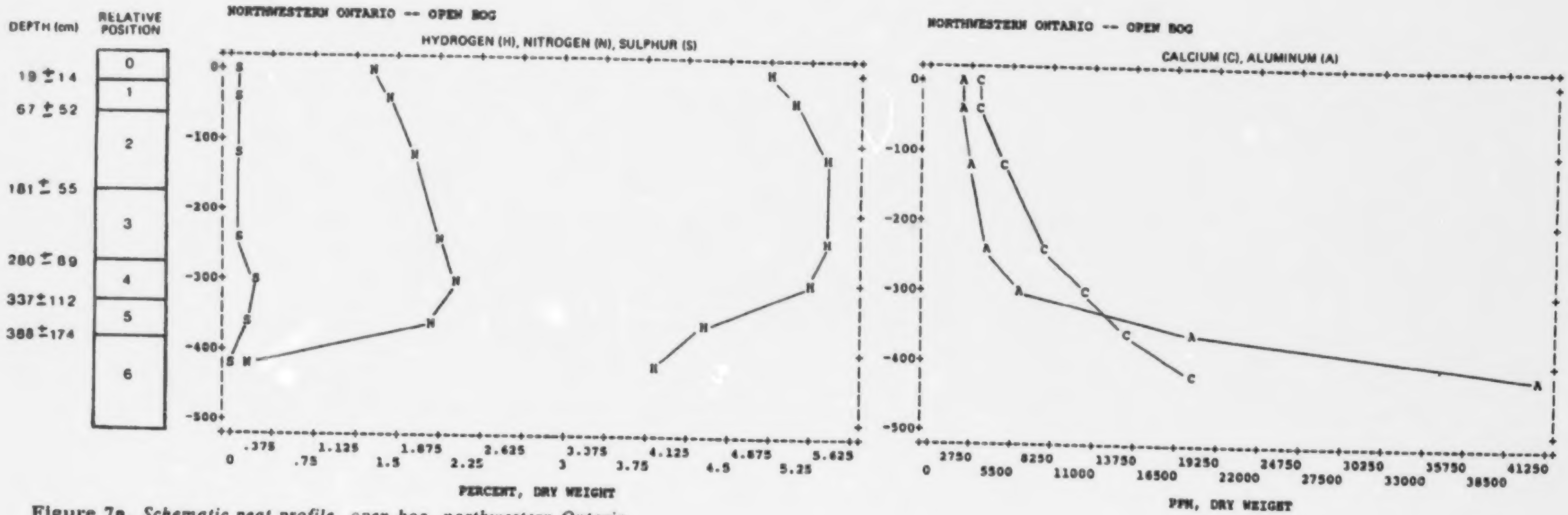


Figure 7a. *Schematic peat profile, open bog, northwestern Ontario.*

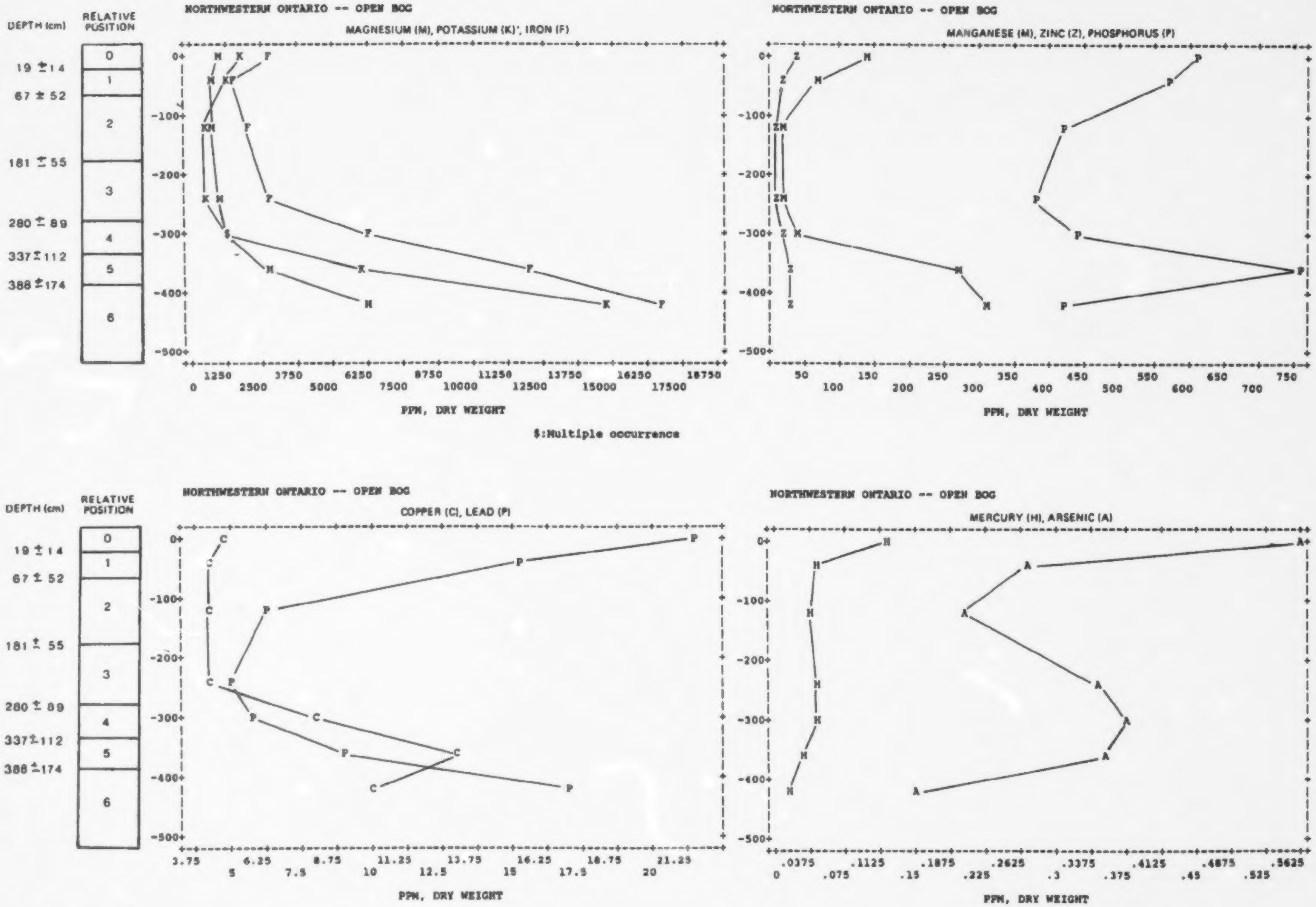


Figure 7a. *Continued.*

TYPICAL PEAT PROFILE - TREED BOG - NORTHWESTERN ONTARIO
(Reported values are means,± standard deviations,n represents the number of values averaged)

Vegetation physiognomy:
Tree cover (%) 17.6±7.5
Tall shrub cover (%) .61±2.1
Low shrub cover (%) 35.9±17.4
Depth to water table (cm) 29.3 ± 12.1
Herbaceceous/graminoid cover (%) 15.1±10.0
Moss cover (%) 94.5±5.5
Surface water pH 4.4±.47

	Midpoint (cm)	Humification	Estimated Peat Type %Moss	%Sedge	%Woody	%Other	pH (H20) (10-15cm below water table)	Cation Exchange Capacity (meq/100g)	Conductivity (umhos/cm)	Fiber Content (%)	Absorptive Capacity	Ash Content (%)	Calorific Value (cal/g)	Bulk Density (dry,g/cc)	Carbon (total %)
0	10	1.1±.4 N=14	95	4	1	0	4.2	153±46 n=14	43.6±21.5 n=13	89±12 n=13	26.3±7.0 n=14	4.7±2.2 n=14	4230±83 n=14	.08±.03 n=14	47.8±1.8 n=14
1st Quartile	50	3.2±.8 N=43	75	20	4	0	4.2	165±88 n=43	46.4±47.9 n=36	64±19 n=43	19.7±6.8 n=43	5.3±2.2 n=43	4526±289 n=42	.09±.02 n=43	50.2±3.4 n=43
2nd Quartile	137	4.2±1.0 N=28	62	32	6	0	4.6	157±70 n=28	40.6±28.1 n=25	54±12 n=27	16.4±5.5 n=28	4.9±1.9 n=28	4825±210 n=27	.10±.03 n=28	53.1±2.3 n=28
3rd Quartile	234	4.0±1.0 N=32	63	28	9	0	5.1	135±45 n=32	44.9±23.6 n=30	50±16 n=32	14.2±4.5 n=32	5.9±2.2 n=32	4794±291 n=32	.12±.05 n=32	52.5±2.0 n=32
4th Quartile	315	4.8±1.3 N=45	57	38	5	0	5.4	127±54 n=46	57.2±38 n=46	46±13 n=46	11.5±3.1 n=44	9.3±4.4 n=46	4620±294 n=46	.13±.03 n=44	52.0±3.3 n=46
25-60% Ash	377	-	-	-	-	-	5.1	88±55 n=6	95.7±64.7 n=6	36±13 n=6	8.7±1.8 n=6	36.1±13.0 n=6	3167±975 n=5	.17±.03 n=6	36.1±7.2 n=6
> 60% Ash	413	-	-	-	-	-	4.3	47 n=1	271 n=1	17 n=1	4.5 n=1	62.6 n=1	1791 n=1	.25 n=1	20.7 n=1

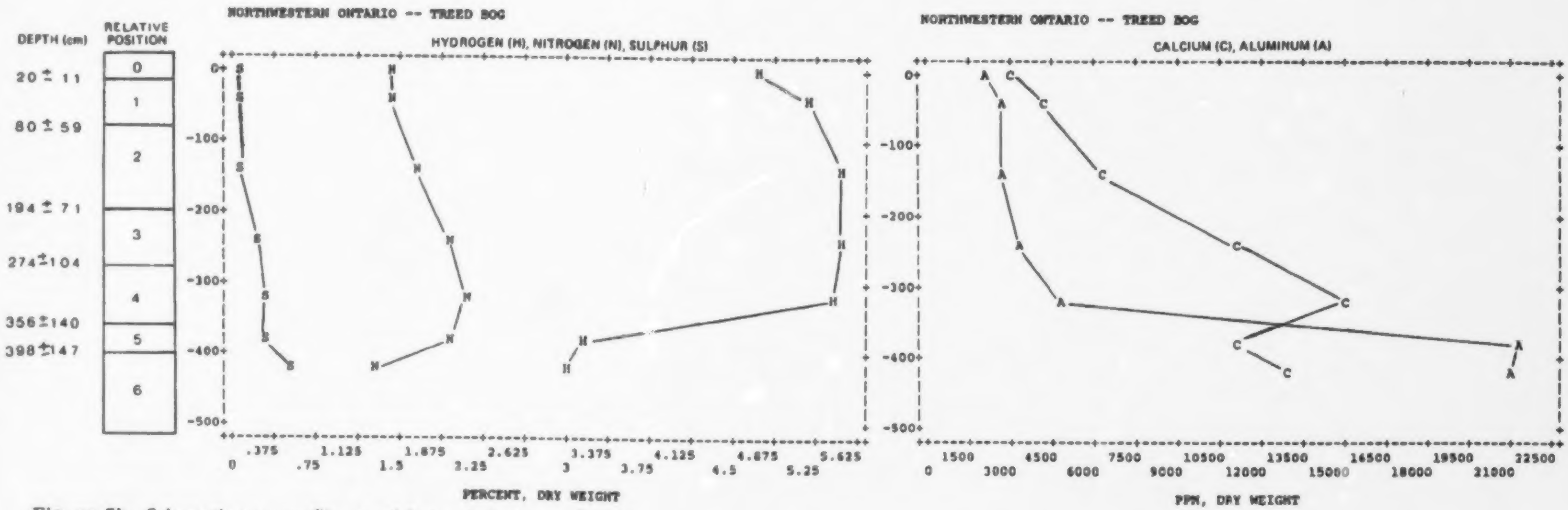


Figure 7b. *Schematic peat profile, treed bog, northwestern Ontario.*

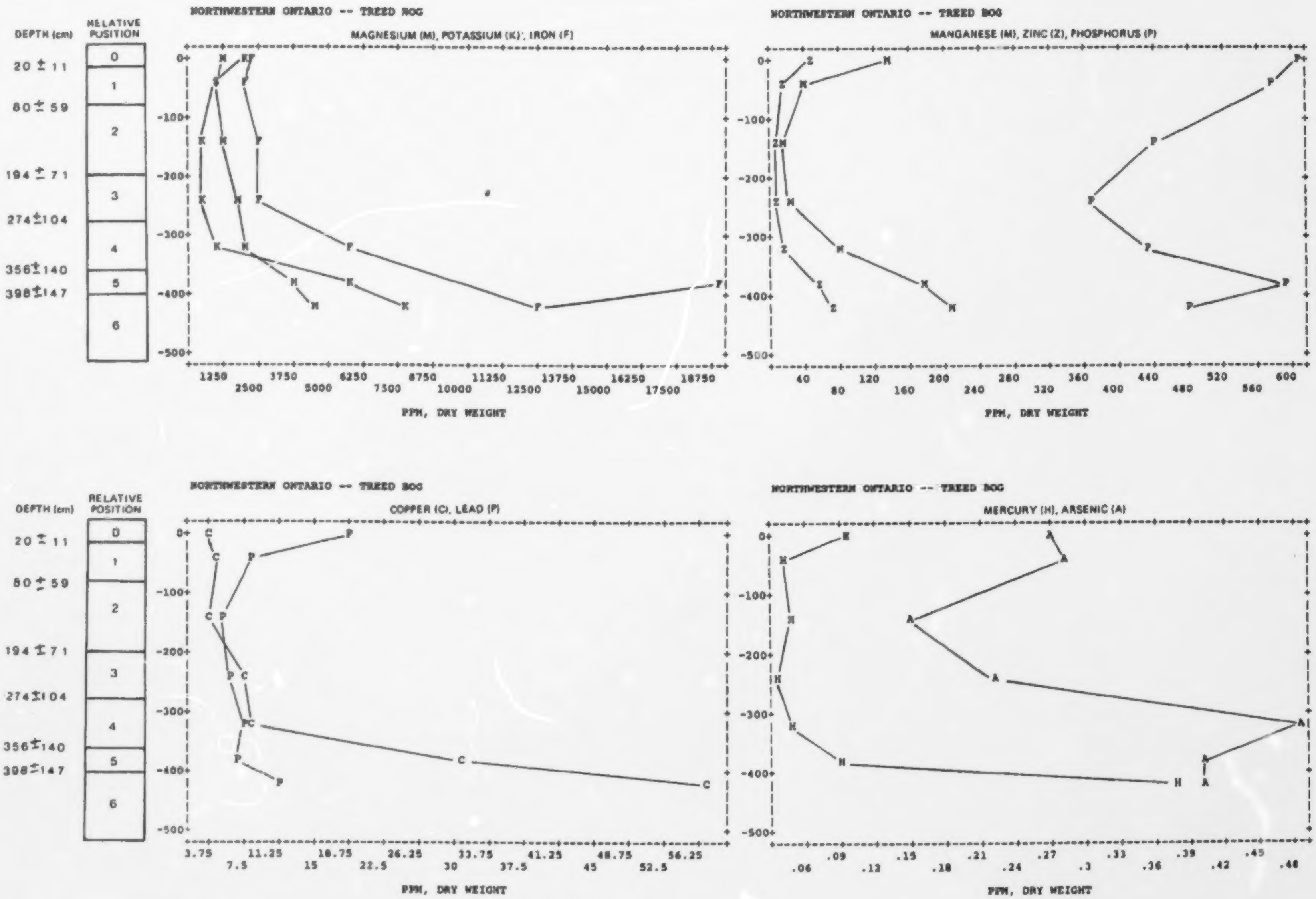


Figure 7b. *Continued.*

TYPICAL PEAT PROFILE - OPEN FEN (INCL. OPF) - NORTHWESTERN ONTARIO
(Reported values are means,± standard deviations,n represents the number of values averaged)

Vegetation physiognomy: Tree cover (%) 2.9±2.6
N=199
Tall shrub cover (%) 4.1±13.1
Low shrub cover (%) 19.1±13.8
Depth to water table (cm) 14.9 ± 9.5

Herbaceous/graminoid cover (%) 33.2±21.6
Moss cover (%) 85.9±17.8
Surface water pH 5.6±.47,
(10-15cm below water table)

Depth (cm) (Mean Bottom)		Midpoint (cm)	Humification	Estimated Peat Type %Moss	%Sedge	%Woody	%Other	pH (H2O)	Cation Exchange Capacity (meq/100g)	Conductivity (umhos/cm)	Fiber Content (%)	Absorptive Capacity	Ash Content (%)	Calorific Value (cal/g)	Bulk Density (dry,g/cc)	Carbon (total %)
0																
17		8.5	1.1±.3 N=27	85	11	4	0	5.8	145±75 n=27	135±143 n=27	81±14 n=26	19.3±7.1 n=27	10.2±6.9 n=26	4010±304 n=27	.11±.04 n=27	47.1±3.6 n=27
83	1st Quartile	49.5	2.9±1.0 N=39	61	33	6	0	5.8	146±63 n=38	77.3±68.5 n=39	60±17 n=39	15.2±4.6 n=39	8.2±2.8 n=39	4465±331 n=38	.10±.03 n=39	49.9±3.9 n=39
166	2nd Quartile	124	3.6±1.2 N=33	57	33	9	0	5.9	163±77 n=33	58.2±64.9 n=33	52±12 n=33	12.0±3.0 n=32	7.6±1.8 n=32	4573±244 n=31	.12±.03 n=32	52.0±2.4 n=32
232	3rd Quartile	199	3.9±1.3 N=36	57	34	10	0	5.8	163±70 n=36	42.1±16.7 n=36	51±13 n=36	12.7±3.5 n=36	8.3±2.8 n=36	4583±264 n=33	.12±.03 n=36	52.0±2.8 n=36
295	4th Quartile	263.5	4.5+1.0 N=49	55	35	10	0	5.8	142+61 n=50	58.3+50.6 n=50	45±13 n=50	11.8±3.6 n=50	10.7±3.2 n=50	4479±303 n=49	.13±.03 n=50	51.1±2.8 n=50
386	25-60% Ash	340.5	-	-	-	-	-	5.7	92±57 n=8	120±77.5 n=8	36±12 n=9	8.2±1.8 n=7	38.5±9.2 n=10	3214±726 n=10	.17±.03 n=7	36.5±8.2 n=10
441	> 60% Ash	413.5	-	-	-	-	-	6.4	26 n=1	118±127 n=2	4.0 n=1	2.5 n=1	75.8±8.8 n=4	1077 n=1	.37 n=1	12.7±4.8 n=4

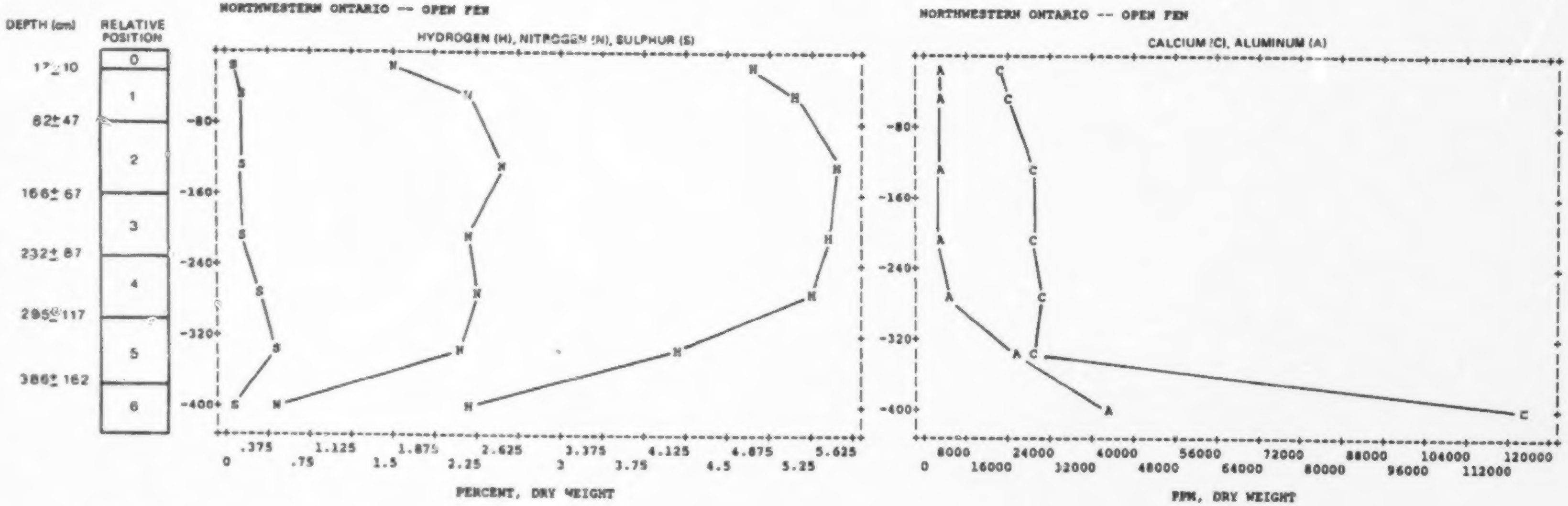


Figure 7c. *Schematic peat profile, open fen, northwestern Ontario.*

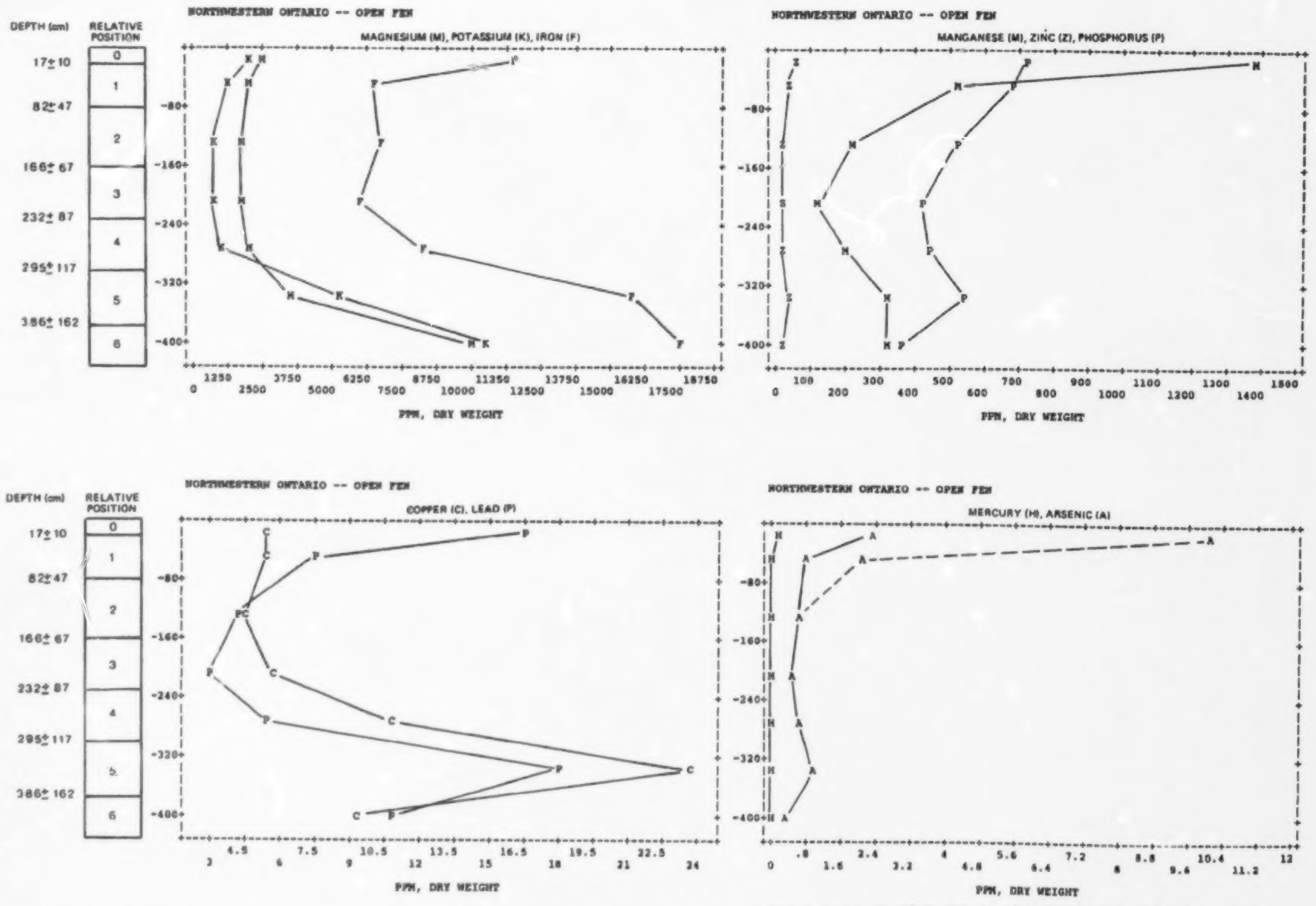


Figure 7c. *Continued.*

TYPICAL PEAT PROFILE - TREED FEN (INCL. TPF) -NORTHWESTERN ONTARIO
(Reported values are means,± standard deviations,n represents the number of values averaged)

Vegetation physiognomy: Tree cover (%) 18.9±7.7
N=43
Tall shrub cover (%) 3.6±5.7
Low shrub cover (%) 33.6±13.8
Depth to water table (cm) 27.8 ± 9.3,

Herbaceceous/graminoid cover (%) 14.2±8.2
Moss cover (%) 66.4±12.7
Surface water pH 5.3±.15,
(10-15cm below water table)

Depth (cm) (Mean Bottom) 0		Midpoint (cm)	Humification	Estimated Peat Type %Moss	%Sedge	%Woody	%Other	pH (H2O)	Cation Exchange Capacity (meq/100g)	Conductivity (umhos/cm)	Fiber Content (%)	Absorptive Capacity	Ash Content (%)	Calorific Value (cal/g)	Bulk Density (dry,g/cc)	Carbon (total %)
13		6.5	1.0 N=4	93	0	8	0	5.5	174±47 n=4	171±138 n=4	89±15 n=4	18.1±5.6 n=4	6.8±32.3 n=4	4147±151 n=4	.11±.02 n=4	48.5±2.0 n=4
52	1st Quartile	32.5	3.0±.8 N=10	79	6	15	0	5.4	196±43 n=10	58.0±34.6 n=10	75±15 n=10	16.7±6.1 n=10	7.0±2.5 n=10	4249±306 n=10	.10±.02 n=10	48.7±2.1 n=10
143	2nd Quartile	97.5	4.0±.8 N=8	64	8	29	0	5.8	174±56 n=8	37.8±8.2 n=8	58±13 n=8	11.5±3.6 n=8	8.1±1.3 n=8	4327±290 n=8	.14±.03 n=8	52.6±3.1 n=8
210	3rd Quartile	176.5	4.2±.8 N=9	68	13	19	0	6.1	193±57 n=9	43.0±14.8 n=9	53±10 n=9	10.8±3.2 n=9	9.3±1.7 n=9	4319±196 n=9	.14±.02 n=9	51.7±2.7 n=9
317	4th Quartile	263.5	4.5±1.4 N=11	77	7	14	0	6.1	162±39 n=10	53.6±13.9 n=10	50±13 n=10	10.6±4.3 n=10	10.6±4.0 n=10	4268±268 n=8	.15±.04 n=10	48.9±3.1 n=10
380	25-60% Ash	348.5	-	-	-	-	-	5.7	70 n=1	50 n=1	44 n=1	8.1 n=1	67.7 n=1	1216 n=1	.25 n=1	16.7 n=1
	> 60% Ash		-	-	-	-	-	-	-	-	-	-	-	-	-	-

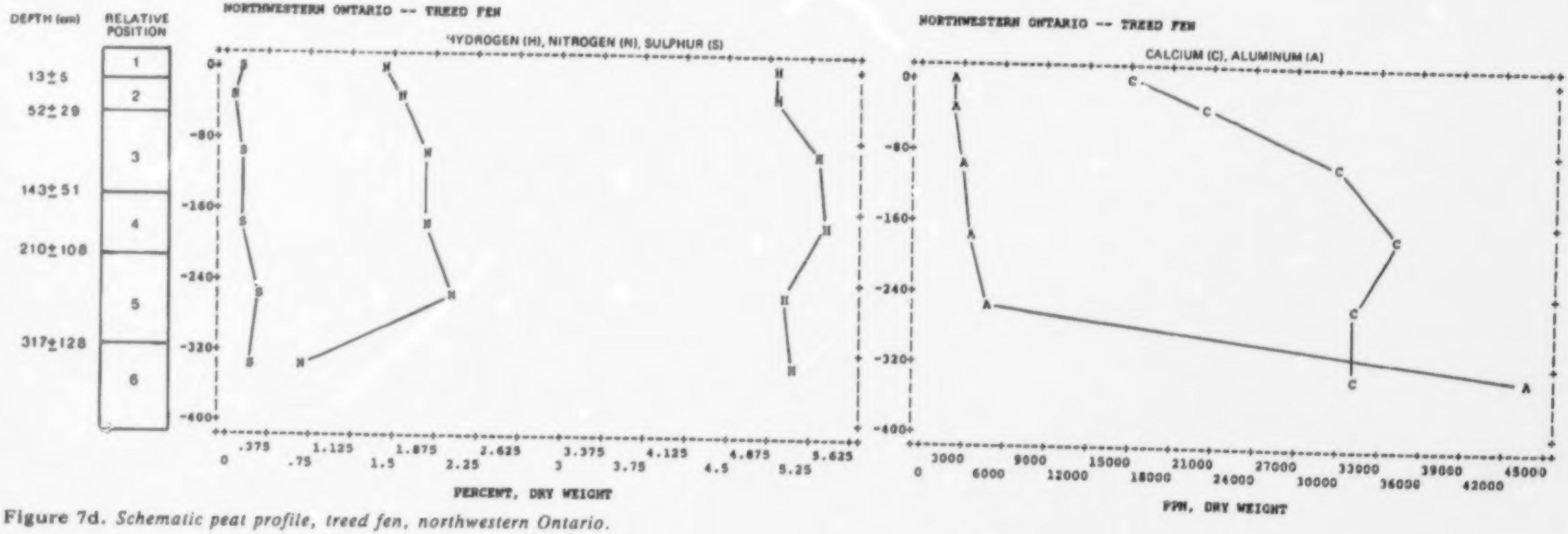


Figure 7d. *Schematic peat profile, treed fen, northwestern Ontario.*

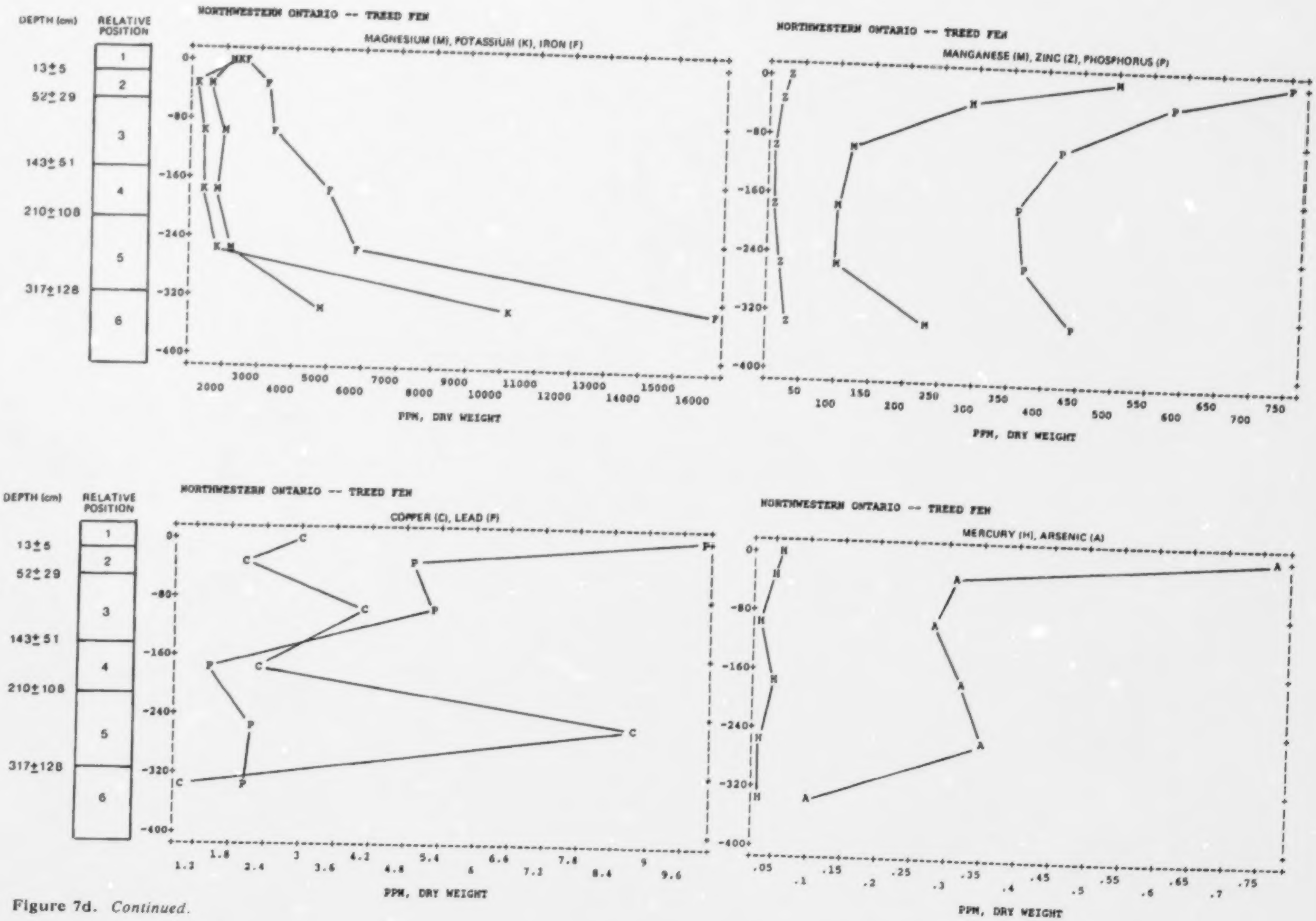


Figure 7d. *Continued.*

TYPICAL PEAT PROFILE - CONIFER SWAMP - NORTHWESTERN ONTARIO
(Reported values are means,± standard deviations,n represents the number of values averaged)

Vegetation physiognomy:
Tree cover (%) 44.9±20.6
Tall shrub cover (%) 5.4±8.2
Low shrub cover (%) 18.4±16.1
Depth to water table (cm) 37.7 ± 10.5
Herbaceceous/graminoid cover (%) 19.4±17.6
Moss cover (%) 89.4±4.8
Surface water pH 4.9 ±.6
(10-15cm below water table)

	Midpoint (cm)	Humification	Estimated Peat Type %Moss	%Sedge	%Woody	%Other	pH (H2O)	Cation Exchange Capacity (meq/100g)	Conductivity (umhos/cm)	Fiber Content (%)	Absorptive Capacity	Ash Content (%)	Calorific Value (cal/g)	Bulk Density (dry g/cc)	Carbon (total %)
0	4.4	1.0±0 N=4	95	0	5	0	5.1	140±76 n=4	68.8±57.4 n=4	82±21 n=4	22.5±13.7 n=4	6.2±3.2 n=4	4272±94.5 n=4	.14±.07 n=4	47.7±1.3 n=4
1st Quartile	36.4	3.4±.7 N=8	81	9	10	0	5.3	159±33 n=8	106±94.2 n=8	63±21 n=8	13.5±6.7 n=8	8.9±2.6 n=8	4349±452 n=7	.12±.02 n=8	48.6±3.0 n=8
2nd Quartile	135	3.8±.8 N=5	60	10	30	0	5.5	148±29 n=5	41.4±10.5 n=5	55±7.4 n=5	11.3±4.0 n=5	7.0±1.6 n=5	4596±60.2 n=4	.14±.05 n=5	52.6±2.4 n=5
3rd Quartile	221.5	3.8±.8 N=6	77	12	12	0	6.3	155±52 n=6	121±187 n=6	60±11 n=6	14.4±4.3 n=6	9.2±4.3 n=6	4370±406 n=5	.11±.02 n=6	49.7±4.3 n=6
4th Quartile	292	4.2±1.0 N=6	75	20	5	0	6.4	135±33 n=6	67.7±15.1 n=6	49±9.9 n=6	13.5±2.1 n=6	10.5±2.7 n=6	4508±229 n=5	.11±.02 n=6	51.2±1.1 n=6
25-60% Ash	362	-	-	-	-	-	7.0	68±13 n=2	331±303 n=2	25±15 n=2	6.7 n=1	46.0±11.9 n=2	1416 n=1	.26 n=1	28.6±2.8 n=2
> 60% Ash	433.5	-	-	-	-	-	-	-	-	-	-	69.7 n=1	-	.03 n=1	13.6 n=1

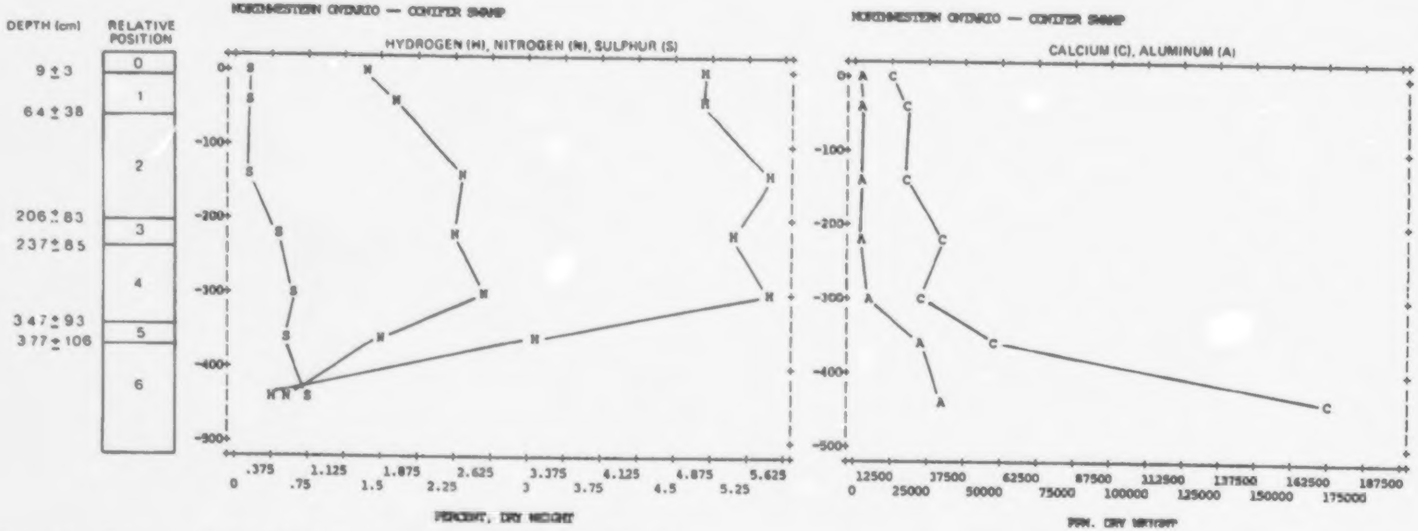


Figure 7e. *Schematic peat profile, conifer swamp, northwestern Ontario.*

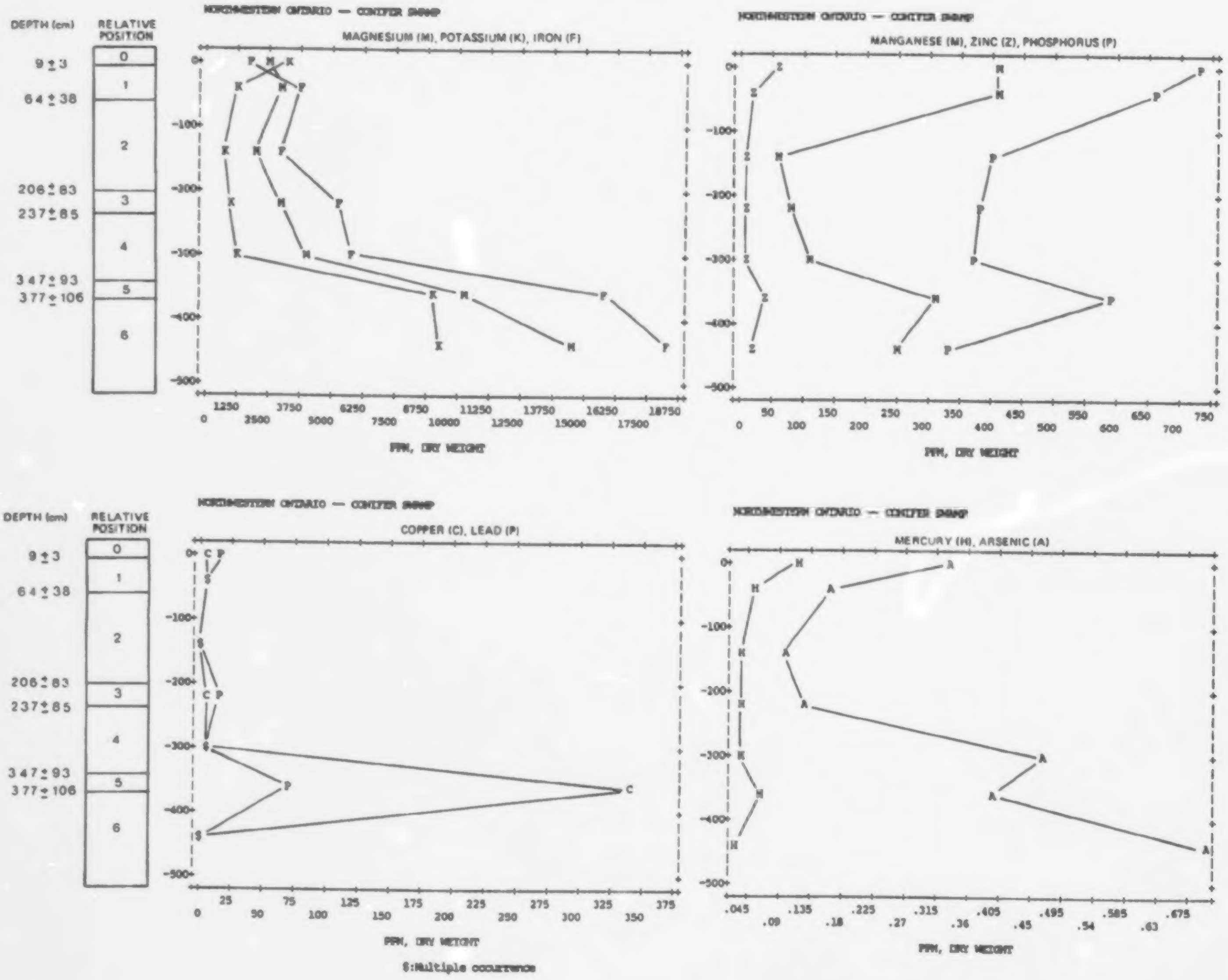
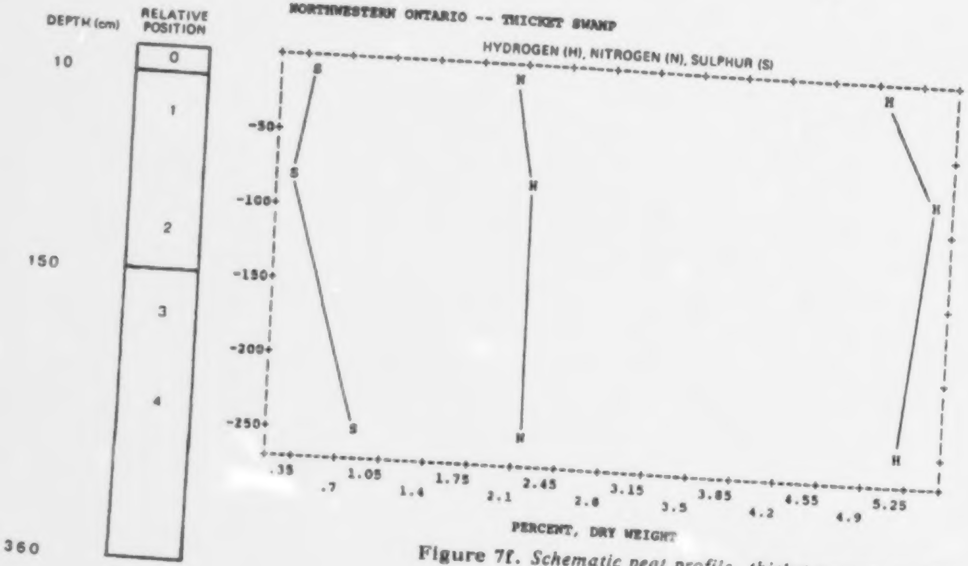


Figure 7e. *Continued.*

TYPICAL PEAT PROFILE - THICKET SWAMP - NORTHWESTERN ONTARIO
(Reported values are means,± standard deviations,n represents the number of values averaged)

Vegetation physiognomy: Tree cover (%) 10.0± 0.0
Tall shrub cover (%) 40.0 ± 0.0
Low shrub cover (%) 25.0 ± 0.0
Depth to water table (cm) 13.0 ± 0.0
Herbaceceous/graminoid cover (%) 38.0 ± 0.0
Moss cover (%) 50.0 ± 0.0
Surface water p H 5.7 ± 0.0
(10-15cm below water table)

	Midpoint (cm)	Humification	Estimated Peat Type %Moss	%Sedge	%Woody	%Other	pH (H2O)	Cation Exchange Capacity (meq/100g)	Conductivity (umhos/cm)	Fiber Content (%)	Absorptive Capacity	Ash Content (%)	Calorific Value (cal/g)	Bulk Density (dry,g/cc)	Carbon (total %)
0	5	1.0 N=1	80	0	20	0	7.2	116 n=1	250 n=1	75 n=1	19.7 n=1	9.3 n=1	-	.1 n=1	47.9 n=1
1st Quartile	80	2.0 N=1	40	0	60	0	6.4	151 n=1	45 n=1	71 n=1	14.9 n=1	6.2 n=1	-	.08 n=1	51.1 n=1
3rd Quartile	255	3.0 N=1	70	0	30	0	6.5	142 n=1	75 n=1	64 n=1	13.7 n=1	9.1 n=1	-	.13 n=1	50.4 n=1
25-60% Ash		-	-	-	-	-	-	-	-	-	-	-	-	-	-
> 60% Ash		-	-	-	-	-	-	-	-	-	-	-	-	-	-



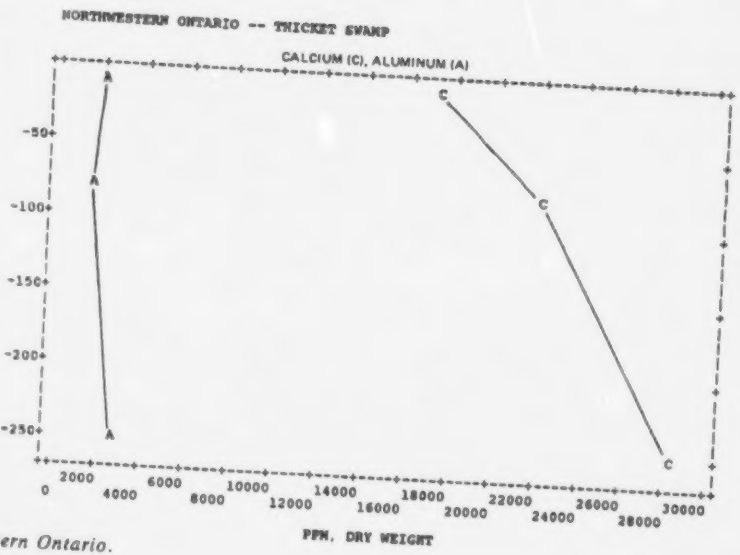


Figure 7f. *Schematic peat profile, thicket swamp, northwestern Ontario.*

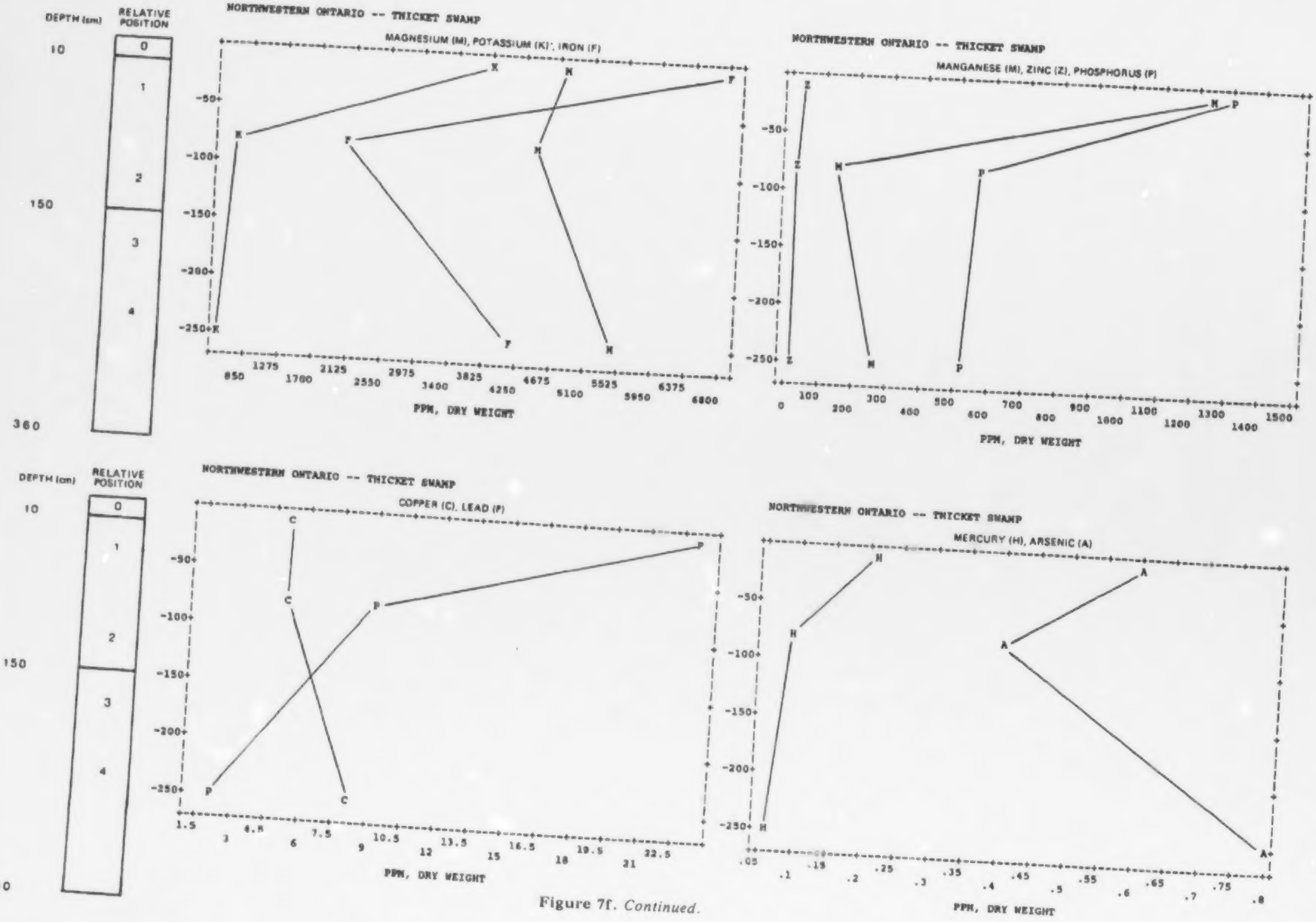


Figure 7f. *Continued.*

TYPICAL PEAT PROFILE - MEADOW MARSH - NORTHWESTERN ONTARIO
(Reported values are means,± standard deviations,n represents the number of values averaged)

Vegetation physiognomy: Tree cover (%) 0.0 ± 0.0
Tall shrub cover (%) 1.3±2.0
Low shrub cover (%) 5.0 ± 7.5
Depth to water table (cm) 101.7 ± 72.5
Herbaceceous/graminoid cover (%) 75.0 ± 19.8
Moss cover (%) 6.0 ± 6.8
Surface water pH 5.5 ± .26
(10-15cm below water table)

	Midpoint (cm)	Humification	Estimated Peat Type %Moss	%Sedge	%Woody	%Other	pH (H2O)	Cation Exchange Capacity (meq/100g)	Conductivity (umhos/cm)	Fiber Content (%)	Absorptive Capacity	Ash Content (%)	Calorific Value (cal/g)	Bulk Density (dry,g/cc)	Carbon (total %)
0															
	5	1.0±0 N=3	80	13	7	0	6.5	82±10 n=3	146±40.1 n=3	41±9.1 n=3	7.3±1.2 n=3	18.9±1.6 n=3	3743±32.2 n=3	.25±.08 n=3	42.2±1.1 n-3
2nd Quartile	55	4.0±1.0 N=3	80	13	7	0	6.0	120±14 n=3	68.7±26.7 n=3	36±9.6 n=3	10.2±1.7 n=3	8.3±.7 n=3	4527±5.7 n=3	.14±.03 n=3	50.2±1.3 n=3
4th Quartile	130	4.7±.6 N=3	93	7	0	0	6.0	117±18 n=3	61.7±13.4 n=3	40±4.0 n=3	10.3±2.6 n=3	8.2±.8 n=3	4641±43.7 n=3	.12±.02 n=3	51.3±1.1 n=3
25-60% Ash		-	-	-	-	-	-	-	-	-	-	-	-	-	-
> 60% Ash		-	-	-	-	-	-	-	-	-	-	-	-	-	-

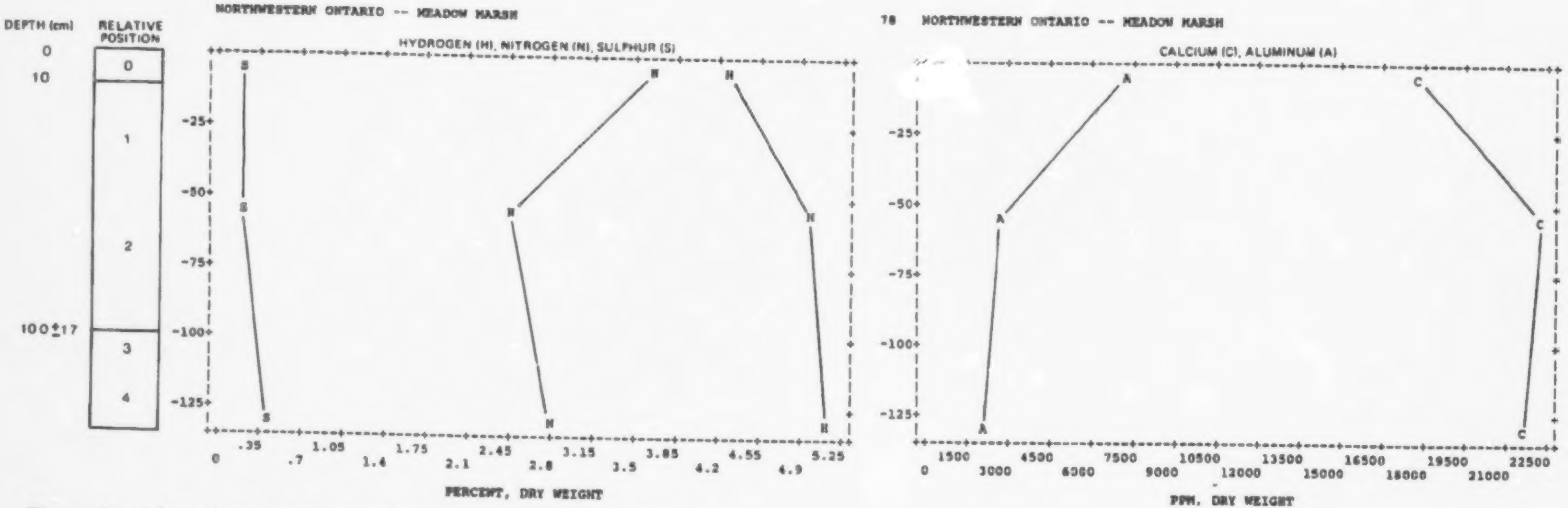


Figure 7g. *Schematic peat profile, meadow marsh, northwestern Ontario.*

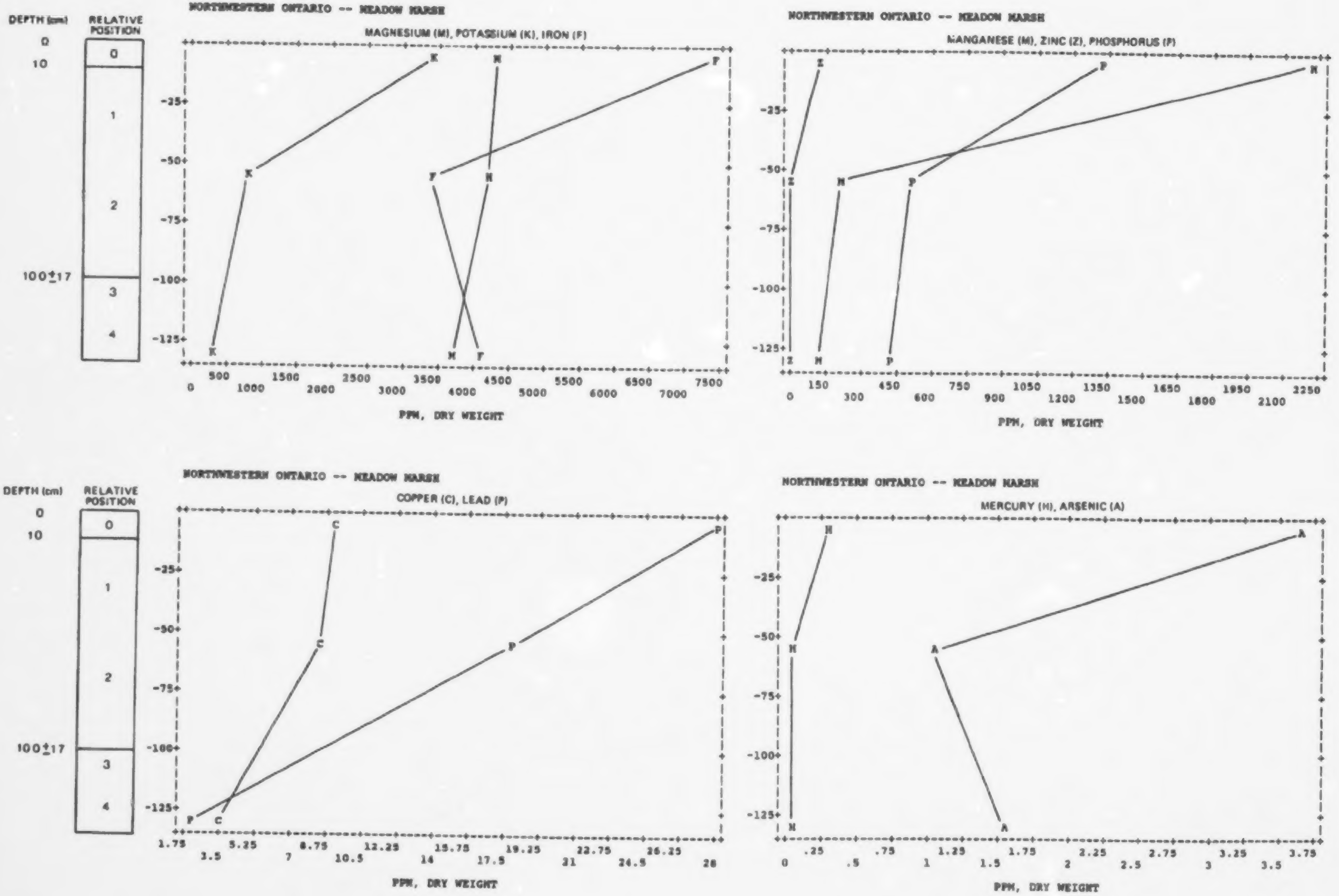


Figure 7g. *Continued.*

8.0 Regional Peat Resource Evaluation

The Peatland Inventory was designed to quantify numerous aspects of the peat and peatland resources of northwestern Ontario. The following regional evaluation summarizes several aspects of the peat and peatland resources. It is based primarily on the extensive field studies described above, from which an overview of the region's peat volumes and peatland distribution is summarized.

An area of 87 970 km² of northwestern Ontario was surveyed by the Peatland Inventory. These study areas are not characteristic of northwestern Ontario as a whole, but represent areas which were known to include the highest concentrations of peatlands close to the population centres of northwestern Ontario. This area as a whole coincided in large part with certain aspects of the surficial geomorphology of the region which were amenable to the initiation, and the development over the postglacial periods, of extensive peat deposits. The glacial and postglacial deposits of particular interest were the clay sediments deposited in broad belts by proglacial Lake Agassiz, and the fine-grained outwash plains formed during the episodic recession of the glacier.

These areas are also landscapes which are actively occupied, and in which peatlands are an economically significant landscape feature. Forestry on peatlands represents an important land use by the pulp and paper industry in the region. Agriculture on shallow or cleared organic soils is widespread as well, especially in the Rainy River study area. The transportation infrastructure of much of the region is well developed. Within this context, the development of a peat resource industry represents an attractive opportunity. This should be considered in terms of the quantity and quality of the resource, the means and the costs of production and transportation to local and southern markets, and the marketability of peat and peat products (including energy) within a competitive Canadian industry.

The peatland inventory addressed the issues of quantity and quality of the resource, the former by direct measurement and regional extrapolation, and the latter by evaluating the peat in the field and analyzing representative peat samples in the laboratory.

8.1 REGIONAL ESTIMATES OF PEATLAND AREAS IN NORTHWESTERN ONTARIO

The estimates of areal coverage by the major peatland types were based on an integration of field studies and Landsat imagery interpretation (Table 6b). The figures should be viewed as estimates which can be refined through more detailed airphoto interpretation and field study of the study areas, but they are the overall results of this inventory project by the methods indicated (Section 3.6 and Figure 8).

The peatlands of the Dryden–Lac Seul, Sioux Lookout and Armstrong areas are typical of most of the Precambrian Shield areas of northwestern Ontario, occupying 4.4 percent of the landscape. Conifer swamp dominates 45.7 percent of the total peatland area, followed by bogs at about 22.6 percent of peatlands (5.6 percent open, and the remainder treed). Fens were also common, about 15.0 percent of the total peatland area, with open fens occurring on about 6.8 percent of the peatlands. Thicket swamps covered about 12.6 percent of all peatlands. Hardwood swamps were rare, only occurring in the southern portion of the region. Marshes were estimated to cover 3.9 percent of the total peatland area, and these figures include estimates of riparian marshes which probably have peat depths less than 40 cm. (The areas for conifer swamp, thicket swamp and marsh may be underestimated because of limitations in the Landsat imagery interpretation and in the focus of field studies on large, open peatland systems.)

The Rainy River study area was largely occupied by postglacial Lake Agassiz, resulting in deposition of relatively impermeable clay and silt materials conducive to subsequent paludification and peatland development. More than 25 percent of this area was estimated to be covered by peatland. Conifer swamp was less frequent (20 percent of all peatland), but thicket swamp was extremely abundant (27 percent), probably in large part the result of abandoned agricultural lands on relatively shallow organic soils. Bogs were unusually common, with treed bog (12 percent of all peatlands) and open bog (13 percent) being equally prevalent. Open fens (8 percent) were especially common on the shallower peat areas westward towards Lake of the Woods, and were frequently patterned, both as extensive ribbed fen drainways (such as at site 52D-21) and as slope fens dotted with tear-shaped conifer swamp islands (site 52D-29). Treed fens (9 percent) were also more frequent in the west of the study area, often as extensive areas adjacent to open fen drainways.

Hardwood and mixed swamps, on shallow if any peat, were estimated to occupy 5 percent of all peatland, occurring mainly in areas on the Lake Agassiz lacustrine deposits. Marshes (7 percent) were not frequent in number but occurred extensively as meadow marsh close to Lake of the Woods, and as emergent marsh and meadow marsh along Lake of the Woods.

The Ignace study area had relatively little peatland on the rugged Precambrian terrain in the south of the study area, but large peatlands were frequent on the silty, sandy outwash deposits associated with the end moraine systems running southeast to northwest through the study area (Hartman, Lac Seul and Sioux Lookout moraines). These peatlands were es-

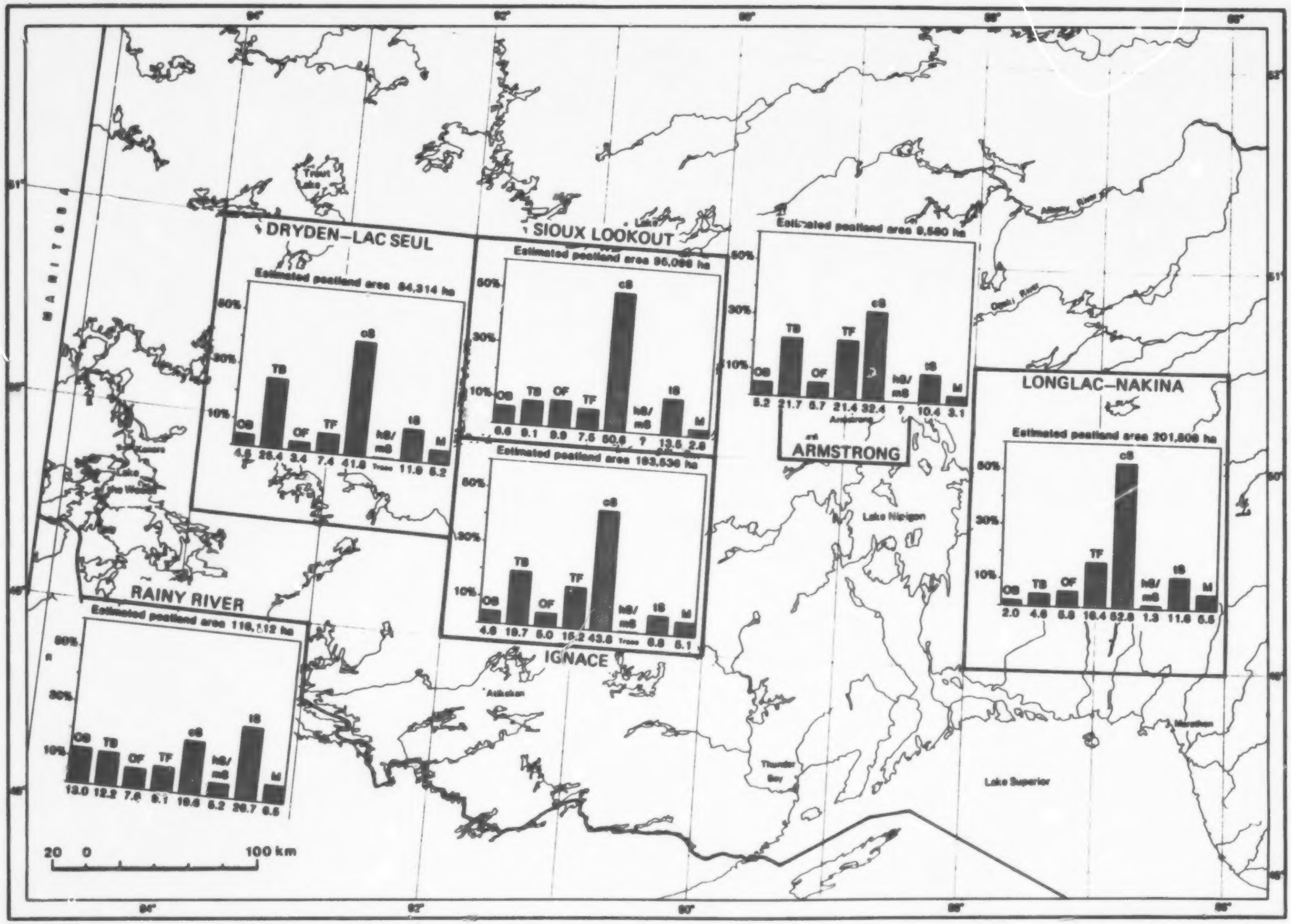

MANITOBA
DRYDEN–LAC SEUL
Estimated peatland area 84,314 ha
OB TB OF TF cS hS/mS tS M
4.6 26.4 3.4 7.4 41.8 Trace 11.9 5.2
SIOUX LOOKOUT
Estimated peatland area 95,096 ha
OB TB OF TF cS hS/mS tS M
6.6 8.1 8.9 7.5 50.6 ? 13.5 2.8
IGNACE
Estimated peatland area 193,536 ha
OB TB OF TF cS hS/mS tS M
4.6 19.7 5.0 15.2 43.8 Trace 6.8 5.1
RAINY RIVER
Estimated peatland area 116,112 ha
OB TB OF TF cS hS/mS tS M
13.0 12.2 7.6 8.1 19.6 5.2 26.7 6.5
ARMSTRONG
Estimated peatland area 9,580 ha
OB TB OF TF cS hS/mS tS M
5.2 21.7 5.7 21.4 32.4 ? 10.4 3.1
LONGLAC–NAKINA
Estimated peatland area 201,806 ha
OB TB OF TF cS hS/mS tS M
2.0 4.6 5.8 16.4 52.8 1.3 11.6 5.5
50%
30%
10%
Trout Lake
Lake of the Woods
Atikokan
Thunder Bay
Lake Nipigon
Armstrong
Albany River
Ogoki River
Marathon
Lake Superior
20 0 100 km
94°
92°
90°
88°
86°
51°
50°
49°
48°

Figure 8. *Estimated peatland areas in northwestern Ontario. (OB - open bog, TB - treed bog, OF - open fen, TF - treed fen, cS - conifer swamp, hS/mS - hardwood/mixed swamp, tS - thicket swamp, M - marsh.)*

pecially large and frequent immediately south of the Hartman Moraine, close to which runs the Trans-Canada Highway and the Canadian Pacific Railway. Largely as a result of this localized concentration of peatlands, the Ignace study area was estimated to have almost 12 percent of its landscape covered by peatland. In order of frequency, these peatlands occurred as conifer swamp (44 percent), bog (20 percent treed bog, 5 percent open bog), fen (15 percent treed fen, 5 percent open fen, 7 percent thicket swamp), marsh (5 percent), and hardwood swamp (trace only).

The Longlac–Nakina study area also had very few peatlands on the rugged Precambrian terrain to the south. Peatlands occurred most frequently on the lacustrine clay and sand deposits, and on outwash sands southwest of the Nakina moraines. However, numerous peatlands also occur on the predominant till ground moraines of the area. These tills derive from the nearby James Bay Lowland, and have high calcium carbonate contents. Whether as till or reworked as lacustrine or outwash deposits, these calcareous substrates have resulted in an exceptional predominance of strongly minerotrophic fens and swamps, some of which are dominated by "brown mosses" rather than the *Sphagnum* spp. most common on northern Ontario peatlands. In order of frequency, the Longlac–Nakina peatlands occurred as conifer swamp (53 percent), fen (16 percent treed fen, 6 percent open fen), thicket swamp (12 percent), bog (5 percent treed bog, 2 percent open bog), marsh (6 percent) and hardwood swamp (ca. 1 percent).

In the northwestern Ontario study areas as a whole, 8.0 percent of the landscape was considered to be peatland, perhaps slightly underestimating the extent of swamp and marsh areas. Conifer swamp dominates the peatland landscape (43 percent; 300 000 ha), followed by treed bog (13 percent, 93 700 ha) and open bog (5.5 percent, 38 500 ha). A greater porportion of more minerotrophic peatlands, both fens and swamps, distinguishes northwestern Ontario from peatlands studied in northeastern Ontario. For example, fens represent 19 percent (131 000 ha) of northwestern Ontario peatlands in comparison to 6 percent (92 000 ha) in northeastern Ontario.

The other peatland types considered in these area estimates for northwestern Ontario were thicket swamp (13 percent; 91 500 ha), marsh (5 percent; 36 000 ha) and hardwood swamp (ca. 1 percent; 9000 ha). These estimates include areas which are probably on very shallow organic soils, or directly on mineral soils or substrates.

8.2 PEAT RESOURCES OF NORTHWESTERN ONTARIO

The inventory surveyed peatlands at several levels of detail, varying from detailed field surveys and laboratory analyses, and reconnaissance surveys, to regional studies based on remote sensing techniques. As in all resource evaluations, the findings of the inventory should be considered in terms of the intensity of investigative effort.

In the course of selecting sites for survey work, peatlands of about 100 ha or more were assigned an identifying number (*see* Appendix D). Many deposits were ill defined and interconnected, but 1400 individual peatland sites were identified in the six study areas. Of these, a number were selected for surveys, on the basis of their proximity to transportation routes, their accessibility, the peatland types and the anticipated peat depths.

8.2.1 DETAILED FIELD SURVEYS (PROBABLE RESOURCES)

A total of 53 peatland sites were surveyed at a level of detail considered appropriate to the estimation of "probable" resource measurements, but short of the level of detail necessary for actual production planning. These 53 peatlands cover a total of 46 680 ha, and were surveyed on a grid matrix of transects laid out at 500 m intervals, sampled at every 100 m on those transects (greater than 5000 individual peat cores). The data collected were plotted areally as isopach maps, elevation maps and peatland classification maps, and stratigraphically as peat type profiles and peat humification profiles.

The total measured peat volume *in situ* in these deposits was 849 500 000 m³, 48 percent of which was well-humified peat (von Post scale $H4^+$). Within these sites, 18 830 ha were areas with deeper than 2 m of peat, excluding any basal ooze or marl intervals. These deeper portions of the sites contained the majority of the surveyed peat, 632 300 000 m³ of *in situ* peat, with 50 percent of this volume being well-humified peat ($H4^+$). Twenty-five of the 53 sites had significant areas of peat deeper than 2 m, i.e., greater than 150 ha in area. They were located mainly in the Rainy River (9 sites), Ignace (7 sites) and Longlac–Nakina (5 sites) study areas.

In all of the northwestern Ontario areas surveyed, the proportion of bog and fen vegetation types was much higher than for the region as a whole, reflecting the survey bias towards deep peat deposits. The percentages of major peatland types surveyed were as follows:

Open bog	12 737 ha	16%	av. 2.9 m deep
Treed bog	18 228 ha	23%	av. 2.7 m deep
Open fen (+poor fen)	13 668 ha	17%	av. 2.6 m deep
Treed fen (+poor fen)	12 139 ha	15%	av. 2.2 m deep
Conifer swamp	11 265 ha	14%	av. 2.6 m deep
Hardwood swamp	62 ha	-	av. 1.6 m deep
Thicket swamp	4 780 ha	6%	av. 1.4 m deep
Marsh	5 881 ha	8%	

(Includes reconnaissance survey sites. See also Tables 6a, 6d).

On a regional scale, relatively few of the available peatlands were surveyed in detail because of the

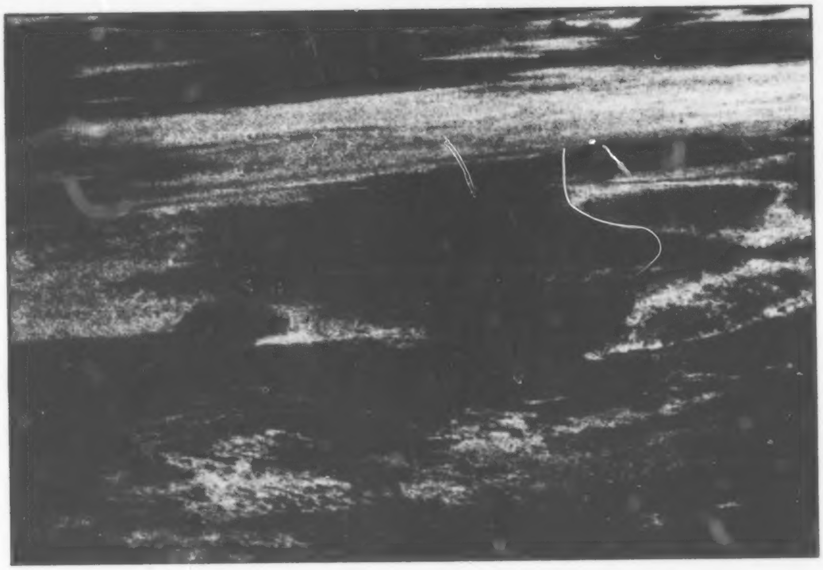


Photo 11. *One of the largest peatlands in northwestern Ontario occurs near Upsala, occupying most of Meinzinger Township (52G-191).*

high numbers of sites in the region, but those that were surveyed included a tremendous variability in terms of peat resources. Many of the sites, independent of hydrological and land use considerations, appear to have significant volumes of potential fuel peat, and some of them are large enough or aggregated closely enough to warrant consideration in terms of large-scale operations. This is particularly the case in the Rainy River, Ignace and Longlac–Nakina study areas.

Although the overall quantities of potential horticultural peat (i.e., H1-3 moss peats) are enormous, only a relatively few of the sites have average thicknesses of such peat more than 1 m occurring over significant areas. However, given the number of peatlands surveyed in detail and the total number of peatlands in the region as a whole, a significant potential is certain. In this regard, several sites in the Rainy River study area (52C-32, 52C-44 and 52D-43) and the Ignace study area (52G-165, 52G-226) appear to have potential for large-scale horticultural or energy peat development (Photos 11, 12). Furthermore, in terms of small-scale production for local use, nursery and tree plantation use, or for mine waste amelioration work, a larger number of these and other sites offer suitable quantity and quality of material.

8.2.2 RECONNAISSANCE FIELD SURVEYS (POSSIBLE RESOURCES)

An additional 92 peatlands covering 25 900 ha were surveyed at a reconnaissance level. On these sites, limited peat coring was undertaken to evaluate the general resource potential of particular sites, and the suitability of sites for further detailed surveys at a later date. The peat volumes estimated for these sites are more approximate estimations, and a total estimate of 678 200 000 m^3 of peat indicates "possible" resources. Sixty-one percent of the peat encountered in these sites was well humified (von Post H4$^+$), and many of these sites were very large deposits within which significant areas deeper than 2 m are certain. The data available on these sites (Appendix A and Open File Reports) are of a more limited nature but are sufficient to direct the attention of interested individuals towards sites of interest. The level of detail is similar to the level of detail undertaken in previous Ontario peatland inventories (e.g., Graham 1979).

8.2.3 REGIONAL RESOURCE ESTIMATES (INFERRED RESOURCES)

For the 87 970 km^2 area surveyed by the inventory in northwestern Ontario, overall resource estimates were derived through the use of remote sensing surveys (Section 3.6; satellite imagery), appraised and modified in relation to more detailed surveys undertaken in the field. The same peatland classification system (Appendix C) was used for all aspects of the inventory, with the intention of integrating the different levels of investigation to infer regional peat and peatland estimates.

Across the region, peatlands were estimated to occupy 8 percent of the entire landscape, a total of 700 200 ha. Of this total area, over 43 percent was estimated to be conifer swamp (300 100 ha), and this figure may be underestimated because of problems inherent in satellite image interpretation. However, this figure excludes the considerable areas of

Photo 12. *A very frequently encountered peat material in northwestern Ontario was a moderately humified (H4) sphagnum-dominated peat with some sedge materials in it.*

former conifer swamp harvested by the forestry industry. Similarly, the estimated total area of thicket swamp (91 500 ha; 13.1 percent) may be underestimated due to difficulties in estimating the extent of successional thicket swamps on cutover conifer swamp areas. Hardwood swamp was estimated to occur on a very small area and may not occur frequently on strictly peat substrates. In order to include all major peatland/wetland types, marshes were also considered. Marshes occur on both peat and mineral substrates; the total estimated coverage was 5.1 percent of the total peatland area (35 800 ha).

The focus of the regional peatland resource inventory was on the bogs and fens of the region, which were known to occur on the deepest peats. Approximately 38 600 ha of open bog were estimated to occur, with tree cover of less than 10 percent. Treed bog was estimated to cover a further 93 700 ha (13.4 percent of all peatland). The total area for all fens was estimated at 131 400 (18.8 percent of peatland).

These data represent an original attempt at estimating peatland areas of northwestern Ontario. The only other comparable estimates are those calculated by Ketcheson and Jeglum (1972) on the basis of Forest Resource Inventory data. The Peatland Inventory study areas straddle three ecological sections (Quetico, Western Transitional and Central Plateau) estimated to have 11 percent, 14 percent and 35 percent, respectively, of total land area in peatland. These authors estimated the extent of black spruce forest (i.e., conifer swamp) at 1 percent, 5 percent and 22 percent of the total land area of the same ecological sections. The Peatland Inventory estimates are comparable, except for the study areas in the Central Plateau section which have relatively lower estimates. This probably reflects both the degree of cutting of peatland forest in the area over the past 20 years, and also the previously mentioned possible underestimates of conifer and thicket swamps attributable to the remote sensing methodology employed.

The only other regional peatland area estimate was that done by Monenco Ontario Ltd. (1981). The northwestern Ontario study areas all fall into what Monenco termed the Western Shield Region. The inventory estimates of total peatland area are proportional to or greater than the Monenco Ontario Ltd. estimates for the entire Western Shield Region, considering that the inventory covered only about one quarter of this Region.

The average peat depth figures used in the estimation of regional peat volumes were depth figures considered most suitable for extrapolation from sites surveyed to sites not surveyed in the same study areas. The figures used are averages of the average peat depths per site by major peatland type, where there were more than three core depths per peatland type per site (Table 6d). These figures were then multiplied by total study area estimates of peatland types to provide study area totals (Table 7). These, in turn were summed to indicate regional totals (Table 11).

Of the total regional volume estimate of 12 640 000 000 m^3 of *in situ* peat, almost half occurs as relatively shallow deposits underlying swamps. However, an estimated 263 600 ha of the

TABLE 11. SUMMARY OF PEAT VOLUME ESTIMATES AND PEATLAND TYPE ESTIMATED FOR ALL STUDY AREAS IN NORTHWESTERN ONTARIO.

Peatland Type	**Estimated Total Areas (ha) in All Study Area**	**Percentage of Total Peatland Area**	**Estimated Total Peat Volume (*in situ*, x10^6m^3)**	**Percentage of Total Estimated Peat Volume**
Open Bog	38 458	5.5	11 134.7	9.0
Treed Bog	93 698	13.4	2 601.0	20.6
Open Fen (and Poor Fen)	43 116	6.2	1 163.3	9.2
Treed Fen (and Poor Fen)	88 316	12.6	1 949.8	15.4
Conifer Swamp	300 126	42.9	4 274.1	33.8
Hardwood or Mixed Swamp	9 125	1.3	91.3	0.7
Thicket Swamp	91 498	13.1	1 039.1	8.2
Marsh	35 836	5.1	388.8	3.1
Totals	700 173 ha	100.0	12 642.1	100.0
Totals for Peatland Types With Average Depths >2 m; in this case Bog and Fen	263 588 ha	37.7	6 848.8	54.2

total peatland area are bog and fen, which predictably have depths averaging greater than 2 m. The volume of peat which this represents is about 6 850 000 000 m^3, a volume equivalent to about 1 233 000 000 tonnes of peat at 50 percent moisture content (using a conversion factor of 1 m^3 *in situ* peat at about 90% M.C. = 0.18 tonne at 50% M.C. (Moisture Content); derived from Scott et al. 1980). If 50 percent of this volume were exploitable fuel peat, the energy equivalent would be 167 000 000 tonnes of oil or 1 067 000 000 barrels of oil (Monenco Ontario Ltd. 1981; p.viii, 25).

At least 50 percent of the overall total area and volume estimates must be discounted as exploitable resource because of various factors such as the noncontinuity of many peatlands, the small size of many peatlands, poor accessibility, land use conflicts, and, especially poor drainability. In addition, the socioeconomic costs and benefits of development remain to be demonstrated.

However, the regional peat resource figures and the detailed survey data provided through this resource inventory indicate a vast and almost entirely unexploited material resource. In terms of forestry, the current major peatland resource industry, the inventory data suggest a significant potential for improving forest site conditions on marginal treed peatlands through drainage practices. In terms of peat extraction, northwestern Ontario has exceptional quantities of peat with the necessary material characteristics for operations ranging from small-scale bulk production for local horicultural uses, to large-scale horticultural peat operations and to energy production for industrial uses.

Appendix A. Summary Tables for Peatlands Surveyed in Northwestern Ontario

1. Rainy River
2. Dryden–Lac Seul
3. Sioux Lookout
4. Ignace
5. Armstrong
6. Longlac–Nakina

(*See* Section 3.3 for sources and context of data.)

APPENDIX A.1 SUMMARY TABLES FOR PEATLANDS SURVEYED IN RAINY RIVER AREA.

(Refer to Section 3.3 for sources and context of data.)

I) DETAILED SURVEY SITES.

	TOTAL PEATLAND			AREA GREATER THAN 2M DEEP										
								UNHUMIFIED PEAT (H1-H3) *						
DETAILED STUDY SITE (U.T.M. Grid Reference)	TOTAL AREA (ha)	TOTAL VOLUME ($\times 10^6$ M^3) (in situ)	VOLUME H4+ ($\times 10^6$ M^3) (in situ)	TOTAL AREA (ha) (no. of basins)	TOTAL VOLUME ($\times 10^6$ M^3) (in situ)	VOLUME H4+ PEAT ($\times 10^6$ M^3) (in situ)	AVERAGE DEPTH (cm) (no. of cores)	AVERAGE THICKNESS (cm) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) ($ MOSS /10 - $ SEDGE/10 - $ WOOD/10 - $ OTHER/10) (no. of cores)	WEIGHTED AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE HEAT VALUE (cal/g) (no. of sampled intervals)	WEIGHTED AVERAGE ASH CONTENT ($) (no. of sampled intervals)	WEIGHTED AVERAGE LAB FIBER CONTENT ($) (no. of sampled intervals)	WEIGHTED AVERAGE LAB PH OF PEAT (no. of sampled intervals)
52C-23 (15 443 5395)	608	13.9	12.0	363 (1)	12.0	11.1	384 (43)	49 (43)	10-0-0-0 (40)	3 (37)	4,118 (2)	8.5 (2)	52 (2)	5.1(2)
52C-31,32 (15 454 5390) (15 458 5392)	1,629	43.9	24.1	1,181 (2)	37.1	20.8	31- 340 (66)	88 (66)	10-0-0-0 (57)	3.0 (56)	4,426 (2)	4.9 (2)	- -	4.3(2)
							32- 429 (103)	223 (103	9-0.5-0.5-0 (10	2.8 (104	4,830 (5)	8.2 (5)	51 (5)	4.7(5)
52C-37 (15 466 5386)	1,583	50.3	37.3	1,140 (1)	35.8	34.6	396 (186	86 (186	8-1-1-0 (182)	2.9 (176	4,373 (3)	5.5 (3)	63 (3)	3.9(3)
52C-44 (15 458 5381)	3,184	110.5	59.3	2,430 (2)	101.4	55.4	453 (276	212 (276	9-1-0-0 (276)	2.9 (276	4,538 (7)	4.7 (7)	56 (7)	4.5(7)
52D-16,17 (15 383 5409)	1,495	17.0	12.4	68 (1)	1.8	0.3	214 (14)	116 (14)	8-1-1-0 (9)	3.0 (9)	4,454 (1)	8.9 (1)	45 (1)	6.0(1)
52D-21 (15 390 5410)	4,833	94.3	51.2	2,650 (1)	94.3	35.3	267 (66)	134 (66)	7-3-0-0 (65)	2.7 (65)	4,438 (2)	5.9 (2)	63 (2)	5.2(2)
52D-26 (15 298 5404)	1,355	29.4	11.5	683 (1)	22.7	9.5	323 (74)	173 (74)	7-2-1-0 (69)	2.8 (69)	4,534 (4)	7.2 (4)	52 (4)	6.5(4)
52D-29 (15 405 5406)	1,299	33.0	13.0	963 (1)	29.1	11.5	302 (132	191 (132	9-1-0-0 (132)	2.8 (124	4,452 (6)	5.9 (13)	66 (13)	5.7(13)
52D-32 (15 410 5405)	1,178	36.9	20.6	1,097 (1)	35.5	19.6	361 (71)	159 (71)	10-0-0-0 (69)	2.6 (69)	4,836 (7)	8.2 (7)	55 (7)	5.2(7)
52D-43 (15 416 5401)	1,496	62.1	17.6	1,466 (1)	60.9	17.5	419 (109	287 (109	8-1-1-0 (107)	2.8 (106	4,710 (3)	5.3 (7)	64 (7)	5.8(7)
TOTAL	18,660	491.3	259.0	12,041	430.5	215.5								

* In averaging these values all H1-H3 intervals were included, whether or not they were in a surfical position.

HUMIFIED PEAT (H4+)									TOTAL PEATLAND					
									PEATLAND CLASSIFICATION					
AVERAGE THICKNESS (cm) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) ($ MOSS /10 - $ SEDGE/10 - $ WOOD/10 - $ OTHER/10) (no. of cores)	WEIGHTED AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE HEAT VALUE (cal/g) (no. of sampled intervals)	WEIGHTED AVERAGE ASH CONTENT ($) (no. of sampled intervals)	WEIGHTED AVERAGE LAB FIBER CONTENT ($) (no. of sampled intervals)	WEIGHTED AVERAGE LAB PH OF PEAT (no. of sampled intervals)	PERCENTAGE OF PEATLAND AREA WITH <10$ TREE COVER	BASAL OOZE cm thick (no. of cores with ooze / total no. of cores)	PEATLAND TYPE	AREA (ha)	AVERAGE DEPTH OF PEAT (m) (no. of cores)	TOTAL PEATLAND STUMP CONTENT ($)	M.N.R ADMINISTRATIVE DISTRICT/ SITE REGION	COMMENTS
336 (43)	9-0-1-0 (43)	4.9 (43)	4,638 (8)	6.8 (8)	44 (8)	5.1(8)	52	23 (9/43)	OB	289	3.8 (34)	0.3	FORT FRANCES /5S	Category A fuel peat deposit.
									TB	148	3.8 (7)			
									cS	47	2.2 (4)			
									tS	96	2.0 (1)			
									M	28	1.5 (2)			
252 (66)	8-1-1-0 (64)	4.6 (63)	4,617 (5)	7.3 (5)	-	5.7(5)	43	133 (29/66)	OB	571	3.6(89)	0.3	FORT FRANCES /5S	31 Category A fuel peat deposit.
									TB	394	4.2(59)			
									cS	201	3.4 (19)			
									tS	400	2.3 (18)			
									M	64	1.4 (29)			32 Category A fuel peat deposit.
206 (103)	8-1-1-0 (82)	4.5 (82)	4,428 (4)	9.8 (4)	38 (4)	5.4(4)								
311 (186)	7-2-1-0 (186)	5.0 (186)	4,579 (16	6.1 (16)	54 (16)	5.4(16)	28	50 (5/186)	OB	239	3.4 (47)	0.5	FORT FRANCES /5S	Category A fuel peat deposit.
									TB	411	3.8(80)			
									OF	162	3.3(23)			
									TF	77	3.6(11)			
									cS	374	3.8 (43)			
									tS	292	1.8(11)			
									M	29	0.3(30)			
241 (276)	8-2-0-0 (273)	4.4 (267)	4,544 (14	7.1 (14)	47 (14)	6.0(14)	57	35 (10/276)	OB	1,265	4.2(154)	0.0	FORT FRANCES /5S	Category A fuel peat deposit.
									TB	817	4.5 (111)			
									cS	521	4.1 (49)			
									tS	412	2.0(22)			
									M	171	0.6 (8)			
98 (14)	9-1-0-0 (13)	4.2 (13)	4,646 (1)	7.3 (1)	39 (1)	6.3(1)	100	10 (2/14)	cS	92	0.8 (6)	0.0	FORT FRANCES /5S	
									tS	9	- (0)			
									M	11,394	1.3 (173)			
133 (66)	7-2-1-0 (66)	4.1 (65)	4,386 (1)	6.8 (1)	51 (1)	6.1(1)	57	10 (2/66)	OF	12,240	1.7(42)	0.3	FORT FRANCES /5S	Category A fuel peat deposit.
									TS	11,614	2.5(58)			
									cS	478	1.2(22)			
									tS	502	1.4(3)			
150 (74)	8-2-0-0 (72)	4.2 (70)	4,309 (6)	11.0(6)	46 (6)	6.4(6)	35	10 (3/74)	OB	3	-(0)	0.3	FORT FRANCES /5S	
									OF	434	2.3 (43)			
									TF	705	2.2(54)			
									cS	143	2.1(13)			
									tS	30	0.9(3)			
									M	40	-(0)_			
111 (132)	8-2-0-0 (124)	4.1 (117)	4,920 (3)	7.1 (5)	51 (5)	6.0(5)	27	10 (2/132)	OB	301	2.2(37)	0.3	FORT FRANCES /5S	Category A fuel peat deposit.
									TB	486	3.2(67)			
									OF	172	3.7(6)			
									TF	116	3.1(21)			
									cS	161	2.8(14)			
									tS	62	2.8(1)			
202 (71)	7-3-0-0 (70)	4.4 (70)	4,830 (6)	9.8 (6)	62 (6)	6.0(6)	33	20 (1/71)	OB	304	3.6(23)	.1	FORT FRANCES /5S	Category A fuel peat deposit.
									TB	608	3.9(43)			
									OF	25	3.9(2)			
									TF	12	- (0)			
									cS	220	3.8(5)			
									tS	7	- (0)			
									M	3	- (0)			
132 (109)	8-1-1-0 (101)	4.3 (101)	4,648 (1)	6.6 (1)	55 (1)	6.6(1)	19	16 (8/109)	OB	49	3.2(3)	0.3	FORT FRANCES /5S	Category A fuel peat deposit.
									TB	402	4.1(40)			
									OF	170	3.6(10)			
									TF	158	3.8(21)			
									cS	601	3.3(55)			
									tS	64	1.4(2)			
									M	52	3.5(4)			

APPENDIX A.1

II) RECONNAISSANCE SURVEY SITES.

AREA: RAINY RIVER

					UNHUMIFIED PEAT (H1-H3) *		
RECONNAISSANCE STUDY SITE (U.T.M. Grid Reference)	TOTAL PEATLAND AREA (ha) x	ESTIMATED AVERAGE DEPTH (cm) (no. of cores) =	ESTIMATED TOTAL VOLUME (x10^6 M^3) (in situ)	ESTIMATED VOLUME H4+ (x10^6 M^3) (in situ)	AVERAGE THICKNESS H1-H3 PEAT (cm) (no. of cores)	AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) ($ MOSS /10 - $ SEDGE/10 - $ WOOD/10 - $ OTHER/10) (no. of cores)
52D-1A (15 381 5417)	2,242	132 (6)	30.5	2.7	120(6)	3.0 (6)	6-4-0-0 (6)
52D-10 (15 413 5418)	783	312 (6)	24.4	18.2	80(6)	2.5 (6)	10-0-0-0 (6)
52D-15 (15 381 5405)	980	106 (5)	10.4	9.4	10 (5)	3.0 (1)	9-1-0-0 (1)
52D-42 (15 416 5406)	859	303 (3)	26.0	24.3	20(3)	2.0 (3)	10-0-0-0 (3)
52D-55 (15 420 5392)	801	178 (4)	14.3	9.9	55(4)	2.5 (5)	10-0-0-0 (4)
52C-4 (15 432 5414)	737	315 (2)	23.2	17.0	85(2)	3.0 (2)	7-2-1-0 (2)
52C-5 (15 428 5403)	384	284 (3)	10.9	5.3	147 (3)	3.0 (2)	10-0-0-0 (3)
52D-6 (15 428 5403)	341	343 (4)	11.7	10.2	45 (4)	3.0 (3)	10-0-0-0 (3)
52C-8 (15 443 5407)	315	354 (4)	11.2	6.5	147(3)	3.0 (3)	9-1-0-0 (3)
52C-10 (15 445 5413)	200	290 (10)	5.8	5.6	9 (10)	3.0 (2)	9-0.5-0.5-0 (2)
52C-12 (15 452 5406)	207	218 (4)	4.5	4.5	3 (4)	2.0 (1)	10-0-0-0 (1)
52C-16 (15 471 5402)	299	360 (9)	10.8	3.6	241(9)	3.0 (9)	9-1-0-0 (9)

HUMIFIED PEAT (H4 +)					PEATLAND CLASSIFICATION			
AVERAGE THICKNESS H4+ PEAT PEAT (cm) (no. of cores)	AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) (% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)	PERCENTAGE OF PEATLAND AREA WITH <10% TREE COVER	BASAL OOZE PRESENT (P) OR ABSENT (A)	PEATLAND TYPE	AREA (ha)	AVERAGE DEPTH OF PEAT (m) (no. of cores)	M.N.R ADMINISTRATIVE DISTRICT/ SITE REGION
12 (6)	4,0(3)	8-1-1-0 (3)	0	A	cS	397	- (0)	FORT FRANCES/ 5S
					tS	652	- (0)	
					M	1193	1,4(7)	
232 (6)	4,0(6)	8-1-1-0 (6)	32	A	OB	250	2,7(3)	FORT FRANCES/ 5S
					TB	207	3,5(3)	
					cS	261	- (0)	
					tS	34	- (0)	
					M	31	- (0)	
96 (5)	4,4(5)	9-0,5-0,5-0 (5)	8	A	OB	8	- (0)	FORT FRANCES/ 5S
					TB	266	- (0)	
					tS	129	- (0)	
					M	577	1,1(5)	
283 (3)	4,4(3)	6-4-0-0 (3)	22	A	OB	186	3,2(2)	FORT FRANCES/ 5S
					TB	152	3,1(1)	
					cS	496	- (0)	
					tS	25	- (0)	
123 (4)	4,2(5)	9-1-0-0 (4)	20	A	OB	17	2,0(1)	FORT FRANCES/ 5S
					TB	117	- (0)	
					OF	140	1,7(3)	
					TF	180	- (0)	
					cS	125	- (0)	
					tS	203	- (0)	
					M	19	- (0)	
230 (2)	4,2(2)	8-1-1-0 (2)	12	P	OB	90	5,0(1)	FORT FRANCES/ 5S
					TF	134	5,5(1)	
					cS	371	- (0)	
					tS	64	- (0)	
					M	78	- (0)	
137 (3)	4,1(3)	8-0-2-0 (2)	6	A	OB	23	4,6(1)	FORT FRANCES/ 5S
					TB	173	2,9(1)	
					cS	119	1,0(1)	
					tS	60	- (0)	
					M	9	- (0)	
298 (4)	4,1(8)	8-2-0-0 (4)	36	P	OB	123	2,5(1)	FORT FRANCES/ 5S
					TB	91	3,7(3)	
					cS	70	- (0)	
					tS	33	- (0)	
					M	24	- (0)	
207 (3)	4,2(3)	8-1-1-0 (3)	10	P	OB	35	6,0(1)	FORT FRANCES/ 5S
					TB	49	5,4(2)	
					cS	135	2,6(1)	
					tS	47	- (0)	
					M	49	- (0)	
281 (10)	5,7(10)	9-0-1-0 (10)	59	P	OF	119	2,9(10)	FORT FRANCES/ 5S
					M	81	- (0)	
215 (4)	4,5(10)	8-1-1-0 (4)	56	P	OB	112	4,2(1)	FORT FRANCES/ 5S
					TB	33	3,7(2)	
					tS	44	2,5(1)	
					M	18	- (0)	
119 (9)	4,5(6)	9-1-0-0 (6)	64	P	OB	192	3,3(8)	FORT FRANCES/ 5S
					TB	77	6,0(1)	
					tS	16	- (0)	
					M	14	- (0)	

APPENDIX A.1

II) RECONNAISSANCE SURVEY SITES (CONTINUED).

AREA: RAINY RIVER

					UNHUMIFIED PEAT (H1-H3) *		
RECONNAISSANCE STUDY SITE (U.T.M. Grid Reference)	TOTAL PEATLAND AREA (ha) X	ESTIMATED AVERAGE DEPTH (cm) (no. of cores) =	ESTIMATED TOTAL VOLUME $(\times 10^{6} M^{3})$ (in situ)	ESTIMATED VOLUME H4+ $(\times 10^{6} M^{3})$ (in situ)	AVERAGE THICKNESS H1-H3 PEAT (cm) (no. of cores)	AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) (% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)
52C-21 (15 438 5395)	1,151	446 (4)	51.3	32.6	163 (4)	3.0 (3)	10-0-0-0 (30
52C-22 (15 440 5398)	352	353 (4)	12.4	10.0	68 (4)	2.4 (4)	10-0-0-0 (4)
52C-26 (15 443 5387)	794	345 (6)	27.4	15.3	153(6)	2.9 (6)	7-1-2-0 (6)
52C-34A (15 465 5391)	472	202 (5)	9.5	7.9	34(5)	2.1 (5)	10-0-0-0 (5)
52C-42 (15 444 5377)	405	204 (5)	8.3	6.9	34 (5)	2.1 (5)	10-0-0-0 (5)
TOTAL	11,322		292.5	189.8			

* in averaging these values all H1-H3 intervals were included, whether or not they were in a surficial position.

HUMIFIED PEAT (H4 +)					PEATLAND CLASSIFICATION			
AVERAGE THICKNESS H4+ PEAT PEAT (cm) (no. of cores)	AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) (% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)	PERCENTAGE OF PEATLAND AREA WITH <10% TREE COVER	BASAL OOZE PRESENT (P) OR ABSENT (A)	PEATLAND TYPE	AREA (ha)	AVERAGE DEPTH OF PEAT (m) (no. of cores)	M.N.R ADMINISTRATIVE DISTRICT/ SITE REGION
283 (4)	4.4(4)	9-1-0-0 (4)	64	A	OB	737	4.5(4)	FORT FRANCES/ 5S
					TB	159	- (0)	
					cS	46	- (0)	
					tS	191	- (0)	
					M	18	- (0)	
285 (4)	4.8 (4)	8-1-1-0 (4)	39	A	OB	137	3.5(4)	FORT FRANCES/ 5S
					TB	52	- (0)	
					cS	73	- (0)	
					tS	78	- (0)	
					M	12	- (0)	
192 (6)	4.7(6)	8-0-2-0 (6)	6	P	OB	49	3.0(1)	FORT FRANCES/ 5S
					TB	176	3.7(2)	
					cS	376	3.6(3)	
					tS	185	- (0)	
					M	8	- (0)	
168 (5)	4.2 (5)	9-0-1-0 (5)	35	A	OB	167	2.8(9)	FORT FRANCES/ 5S
					TB	50	2.9(2)	
					cS	9	- (0)	
					tS	189	- (0)	
					M	57	1.6(1)	
170 (5)	4.2 (5)	9-0-1-0 (5)	38	A	OB	152	1.8(3)	FORT FRANCES/ 5S
					TB	65	2.4(2)	
					cS	18	- (0)	
					tS	170	- (0)	

APPENDIX A.2 SUMMARY TABLES FOR PEATLANDS SURVEYED IN DRYDEN-LAC SEUL AREA.

(Refer to Section 3.3 for sources and context of data.)

I) DETAILED SURVEY SITES.

	TOTAL PEATLAND			AREA GREATER THAN 2M DEEP										
								UNHUMIFIED PEAT (H1-H3) *						
DETAILED STUDY SITE (U.T.M. Grid Reference)	TOTAL AREA (ha)	TOTAL VOLUME $(x10^6 M^3)$ (in situ)	VOLUME H4+ $(x10^6 M^3)$ (in situ)	TOTAL AREA (ha) (no. of basins)	TOTAL VOLUME $(x10^6 M^3)$ (in situ)	VOLUME H4+ PEAT $(x10^6 M^3)$ (in situ)	AVERAGE DEPTH (cm) (no. of cores)	AVERAGE THICKNESS (cm) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) ($ MOSS /10 - $ SEDGE/10 - $ WOOD/10 - $ OTHER/10) (no. of cores)	WEIGHTED AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE HEAT VALUE (cal/g) (no. of sampled intervals)	WEIGHTED AVERAGE ASH CONTENT ($) (no. of sampled intervals)	WEIGHTED AVERAGE LAB FIBER CONTENT ($) (no. of sampled intervals)	WEIGHTED AVERAGE LAB PH OF PEAT (no. of sampled intervals)
52F-36 (15 553 5532)	133	2.1	1.1	48 (3)	1.2	(est.) 1.	309 (36)	154 (36)	7-3-0-0 (25)	2.2 (23)	4,189 (3)	4.2 (3)	97 (3)	3.9 (3)
52F-57 (15 517 5519)	123	2.2	1.6	52 (1)	1.4	0.4	284 (45)	37 (45)	9-1-0-0 (44)	2.0 (44)	4,220 (1)	12.7 (1)	69 (1)	5.0 (1)
52F-60 (15 533 5516)	1,268	20.7	12.6	412 (1)	5.2	3.3	321 (87)	94 (87)	7-3-0-0 (87)	2.4 (87)	4,380 (5)	5.6 (5)	79 (5)	4.5 (5)
52F-113 (15 558 5497)	2,822	14.3	9.6	14 (1)	0.3	0.2	238 (22)	69 (22)	4-5-1-0 (19)	2.4 (19)	4,095 (2)	9.7 (2)	75 (3)	4.6 (2)
52K-20 (15 471 5624)	319	7.6	5.7	249 (1)	7.0	5.4	309 (52)	68 (52)	9-1-0-0 (48)	2.5 (48)	4,460 (4)	5.9 (4)	72 (4)	4.1 (4)
52K-85 (15 515 5549)	149	3.3	2.3	73 (1)	2.5	1.9	369 (38)	96 (38)	6.5-2.5-1-0 (38	2.3 (38)	4,553 (3)	8.8 (3)	88 (3)	4.9 (3)
52K-86 (15 531 5541)	125	2.6	1.9	59 (1)	2.1	1.8	389 (24)	86 (24)	9-0-1-0 (24)	2.3 (24)	4,416 (4)	9.1 (4)	72 (4)	5.6 (4)
TOTAL	14,939	52.7	34.8	644	19.8	14.0								

* In averaging these values all H1-H3 intervals were included, whether or not they were in a surficial position.

HUMIFIED PEAT (H4+)									TOTAL PEATLAND					
									PEATLAND CLASSIFICATION					
AVERAGE THICKNESS (cm) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) ($ MOSS /10 - $ SEDGE/10 - $ WOOD/10 - $ OTHER/10) (no. of cores)	WEIGHTED AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE HEAT VALUE (cal/g) (no. of sampled intervals)	WEIGHTED AVERAGE ASH CONTENT ($) (no. of sampled intervals)	WEIGHTED AVERAGE LAB FIBER CONTENT ($) (no. of sampled intervals)	WEIGHTED AVERAGE LAB PH OF PEAT (no. of sampled intervals)	PERCENTAGE OF PEATLAND AREA WITH <10$ TREE COVER	BASAL OOZE cm thick (no. of cores with ooze / total no. of cores)	PEATLAND TYPE	AREA (ha)	AVERAGE DEPTH OF PEAT (m) (no. of cores)	TOTAL PEATLAND STUMP CONTENT ($)	M.N.R ADMINISTRATIVE DISTRICT/ SITE REGION	COMMENTS
155 (36)	3-5-2-0 (25)	5.6 (25)	4,669 (7)	6.6 (7)	66 (7)	5.0 (7)	91	252 (16/36)	OB	28	3.0 (17)	3.8	SIOUX LOOKOUT / 4S	
									TB	40	2.3 (16)			
									OPF	-	0.4 (1)			
									OF	47	1.6 (3)			
									TF	3	- (0)			
									tS	10	- (0)			
									M	5	2.0 (1)			
247 (45)	1-7-2-0 (45)	5.2 (45)	4,457 (7)	9.5 (8)	60 (8)	5.6 (8)	24	0 (0/45)	OB	30	2.6 (13)	4.3	DRYDEN/ 4S	Category B fuel peat deposit.
									TB	80	2.0 (29)			
									cS	3	- (0)			
									tS	10	1.1 (2)			
227 (87)	1-7.5-1.5-0 (87)	5.9 (87)	4,735 (14)	8.1 (14)	66 (14)	5.1 (14)	74	21 (8/87)	OB	293	2.5 (53)	3.6	SIOUX LOOKOUT /4S	Category A fuel peat and horticultural peat deposit.
									TB	505	2.3 (62)			
									TPF	-	3.0 (1)			
									OF	296	2.2 (38)			
									TF	174	2.0 (29)			
169 (22)	2-7-1-0 (17)	5.3 (17)	4,770 (7)	8.7 (7)	55 (7)	5.1 (7)	-	10 (1/22)	OB	778	1.0 (131)	3.4	IGNACE/ 4S	
									TB	1337	1.1 (155)			
									OPF	8	- (0)			
									TPF	9	1.2 (1)			
									OF	376	1.2 (48)			
									TF	300	1.0 (44)			
									cS	14	1.0 (1)			
									tS	-	1.0 (2)			
241 (52)	4-4-2-0 (52)	5.9 (52)	4,623 (9)	8.3 (9)	59 (9)	5.3 (9)	0	23 (12/52)	OB	-	1.9 (2)	3.4	RED LAKE/ 4S	Category A fuel peat deposit.
									TB	155	2.6 (46)			
									OPF	9	2.4 (1)			
									OF	-	2.4 (2)			
									TF	14	1.4 (3)			
									cS	122	2.6 (15)			
									tS	13	- (0)			
									M	6	2.7 (2)			
273 (38)	4-3-3-0 (38)	5.3 (38)	4,599 (14)	9.6 (14)	60.0 (14)	5.5 (14)	51	47 (9/38)	OB	55	3.3 (19)	3.1	DRYDEN/ 4S	Category B fuel peat deposit.
									TB	57	2.6 (27)			
									OF	26	4.0 (5)			
									TF	3	- (0)			
									cS	4	2.6 (2)			
									tS	4	0.9 (1)			
303 (24)	4-4-2-0 (24)	5.4 (24)	4,689 (6)	6.7 (6)	63 (6)	5.0 (6)	70	0 (0/24)	OB	56	4.5 (14)	4.0	SIOUX LOOKOUT /4S	Category B fuel peat deposit.
									TB	52	2.9(10)			
									OPF	9	1.9 (2)			
									TPF	8	4.1 (2)			
									tS	-	0.3 (1)			

APPENDIX A.2
II) RECONNAISSANCE SURVEY SITES.

AREA: DRYDEN - LAC SEUL

RECONNAISSANCE STUDY SITE (U.T.M. Grid Reference)	TOTAL PEATLAND AREA (ha) X	ESTIMATED AVERAGE DEPTH (cm) (no. of cores) =	ESTIMATED TOTAL VOLUME $(x10^{6} M^{3})$ (in situ)	ESTIMATED VOLUME H4+ $(x10^{6} M^{3})$ (in situ)	UNHUMIFIED PEAT (H1-H3) * AVERAGE THICKNESS H1-H3 PEAT (cm) (no. of cores)	AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) (% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)
52F-59 (15 527 5523)	64	208 (5)	1.3	1.3	6 (5)	2.0 (1)	9-0-1-0 (1)
52F-103 (15 517 5492)	140	461 (6)	6.5	5.2	92 (6)	2.5 (6)	7.5-2-0.5-0 (6)
52F-108 (15 544 5494)	138	262 (5)	3.6	3.1	40 (5)	2.4 (5)	6-3-1-0 (5)
52F-114 (15 560 5491)	600	207 (12)	12.4	8.2	70 (12)	2.3 (11)	4-5-1-0 (11)
52K-1 (15 459 5639)	70	123 (4)	0.9	0.5	50 (4)	1.9 (4)	8-1-1-0 (4)
52K-2 (15 468 5641)	119	354 (5)	6.7	3.0	102 (5)	2.0 (5)	9-1-0-0 (5)
52K-7 (15 481 5642)	158	528 (6)	8.3	5.2	198 (6)	2.5 (6)	6-3-1-0 (6)
52K-18 (15 464 5636)	86	317 (6)	2.7	2.4	38 (6)	2.1 (6)	8-0-2-0 (6)
52K-21A (15 474 5632)	55	117 (3)	0.6	0.5	33 (3)	2.0 (3)	3-7-0-0 (3)
52K-21B (15 472 5628)	106	202 (5)	2.1	1.6	50 (5)	2.5 (5)	6-3-1-0 (5)
52K-28 (15 488 5632)	130	287 (3)	3.7	3.2	40 (3)	2.5 (3)	8-2-0-0 (3)
52K-30 (15 489 5632)	109	364 (5)	4.0	2.2	164 (5)	2.5 (5)	6-3-1-0 (5)
52K-57 (15 480 5610)	67	378 (4)	2.5	1.9	88 (4)	2.4 (4)	7-1-2-0 (4)
52K-74 (15 494 5581)	84	273 (4)	2.3	2.1	23 (4)	2.0 (4)	10-0-0-0 (4)

HUMIFIED PEAT (H4 +)					PEATLAND CLASSIFICATION			
AVERAGE THICKNESS H4+ PEAT PEAT (cm) (no. of cores)	AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) (% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)	PERCENTAGE OF PEATLAND AREA WITH <10% TREE COVER	BASAL OOZE PRESENT (P) OR ABSENT (A)	PEATLAND TYPE	AREA (ha)	AVERAGE DEPTH OF PEAT (m) (no. of cores)	M.N.R ADMINISTRATIVE DISTRICT/ SITE REGION
202 (5)	6.3 (5)	0-7-3-0 (5)	0	A	TB	12	3.6 (1)	DRYDEN/ 4S
					cS	45	2.0 (3)	
					tS	7	0.8 (1)	
370 (6)	4.8 (6)	5-3-2-0 (6)	33	P	OB	46	5.0 (3)	DRYDEN/ 4S
					TB	57	4.2 (3)	
					TF	26	- (0)	
					cS	5	- (0)	
					tS	6	- (0)	
222 (5)	5.0 (5)	3.5-4.5-2-0 (5)	18	P	OB	19	2.8 (1)	DRYDEN/ 4S
					TB	9	3.0 (2)	
					OF	7	0.4 (2)	
					cS	50	3.7 (1)	
					tS	53	- (0)	
137 (12)	4.9 (11)	0-7-3-0 (11)	36	P	OB	66	3.3 (1)	DRYDEN/ 4S
					TB	206	1.6 (4)	
					OF	154	3.4 (4)	
					TF	166	0.7 (3)	
					tS	8	- (0)	
73 (4)	4.7 (4)	5.5-4.5-0-0 (4)	70	A	OB	49	1.0 (2)	RED LAKE/ 4S
					TB	19	1.5 (2)	
					M	2	- (0)	
252 (5)	5.2 (5)	3-6-1-0 (5)	3	A	TB	105	3.5 (5)	RED LAKE/ 3S
					OF	4	- (0)	
					TF	10	- (0)	
330 (6)	5.0 (6)	1-8-1-0 ([illegible])	41	P	OB	64	6.1 (3)	RED LAKE/ 3S
					TB	86	4.5 (3)	
					cS	8	- (0)	
278 (6)	5.7 (4)	3-5-2-0 (6)	6	P	TB	28	2.3 (1)	RED LAKE/ 4S
					OF	5	- (0)	
					TF	53	4.2 (3)	
83 (3)	7.6 (3)	0-10-0-0 (3)	100	A	OB	3	0.9 (1)	RED LAKE/ 4S
					OF	52	1.4 (2)	
152 (5)	6.2 (5)	1-7-2-0 (5)	12	A	TB	58	1.9 (3)	RED LAKE/ 4S
					OF	12	2.3 (1)	
					TF	36	1.9 (1)	
247 (3)	5.5 (3)	1-6-3-0 (3)	0	A	TF	130	2.9 (3)	RED LAKE/ 3S
200 (5)	4.8 (5)	3-6-1-0 (5)	26	P	OB	28	4.3 (1)	RED LAKE/ 3S
					TB	81	3.5 (4)	
290 (4)	5.3 (4)	0-8-2-0 (4)	8	P	OF	5	- (0)	RED LAKE/ 4S
					TF	62	4.0 (2)	
250 (4)	5.9 (4)	0-6-4-0 (4)	0	P	TF	77	2.7 (4)	DRYDEN/ 4S
					M	7	- (0)	

APPENDIX A.2

II) RECONNAISSANCE SURVEY SITES (CONTINUED).

AREA: DRYDEN - LAC SEUL

RECONNAISSANCE STUDY SITE (U.T.M. Grid Reference)	TOTAL PEATLAND AREA (ha)	X	ESTIMATED AVERAGE DEPTH (cm) (no. of cores)	=	ESTIMATED TOTAL VOLUME $(\times 10^{6}\ \mathrm{M}^{3})$ (in situ)	ESTIMATED VOLUME H4+ $(\times 10^{6}\ \mathrm{M}^{3})$ (in situ)	UNHUMIFIED PEAT (H1-H3) * AVERAGE THICKNESS H1-H3 PEAT (cm) (no. of cores)	UNHUMIFIED PEAT (H1-H3) * AVERAGE HUMIFICATION (von Post scale) (no. of cores)	UNHUMIFIED PEAT (H1-H3) * WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) (% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)
52K-82 (15 493 5548)	51		328 (5)		1.7	0.9	156 (5)	2.8 (5)	8-2-0-0 (5)
54K-83 (15 509 5553)	285		94 (9)		2.7	1.5	43 (9)	2.2 (9)	8-1-1-0 (9)
52K-84 (15 509 5549)	137		271 (7)		3.7	2.5	94 (7)	2.3 (7)	8-2-0-0 (7)
52K-87 (15 549 5546)	73		182 (4)		1.3	0.5	117 (4)	2.1 (4)	4-5-1-0 (4)
TOTAL	2,472				67.0	45.7			

* In averaging these values all H1-H3 intervals were included, whether or not they were in a surficial position.

HUMIFIED PEAT (H4 +)					PEATLAND CLASSIFICATION			
AVERAGE THICKNESS H4+ PEAT PEAT (cm) (no. of cores)	AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) (% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)	PERCENTAGE OF PEATLAND AREA WITH <10% TREE COVER	BASAL OOZE PRESENT (P) OR ABSENT (A)	PEATLAND TYPE	AREA (ha)	AVERAGE DEPTH OF PEAT (m) (no. of cores)	M.N.R ADMINISTRATIVE DISTRICT/ SITE REGION
172 (5)	5.1 (5)	2-5-3-0 (5)	35	P	OB	18	3.4 (2)	DRYDEN/ 4S
					TB	25	2.7 (2)	
					OF	6	4.3 (1)	
					cS	2	- (0)	
51 (9)	5.8 (7)	5-5-0-0 (7)	35	A	OB	79	1.0 (2)	DRYDEN/ 4S
					TB	123	1.1 (5)	
					TPF	52	0.4 (2)	
					OF	23	- (0)	
					TF	8	- (0)	
179 (7)	5.5 (7)	4-5-1-0 (7)	71	P	OB	93	2.7 (6)	DRYDEN/ 4S
					TB	39	1.9 (1)	
					OPF	5	- (0)	
65 (4)	6.1 (2)	1-5-4-0 (2)	41	P	OB	30	1.7 (3)	SIOUX LOOKOUT/ 4S
					cS	38	2.2 (1)	
					tS	5	- (0)	

APPENDIX A.3 SUMMARY TABLES FOR PEATLANDS SURVEYED IN SIOUX LOOKOUT AREA.

(Refer to Section 3.3 for sources and context of data.)

I) DETAILED SURVEY SITES.

	TOTAL PEATLAND			AREA GREATER THAN 2M DEEP										
								UNHUMIFIED PEAT (H1-H3) *						
DETAILED STUDY SITE (U.T.M. Grid Reference)	TOTAL AREA (ha)	TOTAL VOLUME ($\times 10^6$ M^3) (in situ)	VOLUME H4+ ($\times 10^6$ M^3) (in situ)	TOTAL AREA (ha) (no. of basins)	TOTAL VOLUME ($\times 10^6$ M^3) (in situ)	VOLUME H4+ PEAT ($\times 10^6$ M^3) (in situ)	AVERAGE DEPTH (cm) (no. of cores)	AVERAGE THICKNESS (cm) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) (% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)	WEIGHTED AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE HEAT VALUE (cal/g) (no. of sampled intervals)	WEIGHTED AVERAGE ASH CONTENT (%) (no. of sampled intervals)	WEIGHTED AVERAGE LAB FIBER CONTENT (%) (no. of sampled intervals)	WEIGHTED AVERAGE LAB PH OF PEAT (no. of sampled intervals)
52J-29 (15 675 5642)	563	7.7	6.1	150 (1)	4.8	4.0	349 (59)	56 (59)	9-1-1-0 (59)	2.7 (59)	4,503 (8)	5.3 (8)	71 (8)	3.2 (8)
52J-113 (15 671 5601)	304	3.1	2.5	38 (1)	1.0	0.9	273 (15)	17 (15)	9-0-1-0 (15)	2.9 (15)	4,263 (2)	8.2 (2)	72 (2)	3.7 (2)
52J-125 (15 657 5583)	201	3.3	2.8	71 (1)	2.5	2.3	373 (27)	44 (27)	9-1-0-0 (26)	2.8 (26)	4,298 (4)	6.5 (4)	77 (4)	5.6 (4)
52J-168 (15 661 5563)	76	1.1	0.9	21 (1)	0.6	0.5	322 (13)	38 (13)	9-1-0-0 (13)	2.9 (13)	4,394 (6)	3.8 (6)	82 (6)	4.3 (6)
52J-185 (15 595 5540)	133	2.4	2.1	56 (1)	1.8	1.7	347 (23)	25 (23)	9-1-0-0 (23)	2.7 (23)	4,384 (7)	3.2 (7)	80 (7)	4.1 (7)
52J-187 (15 611 5545)	197	2.8	2.4	58 (1)	1.8	1.7	337 (25)	37 (25)	9-1-0-0 (24)	2.7 (24)	4,508 (5)	5.1 (5)	84 (5)	4.4 (5)
52J-190 (15 635 5543)	159	2.4	2.0	55 (1)	1.7	1.6	311 (25)	24 (25)	9-1-1-0 (25)	2.6 (25)	4,134 (5)	7.5 (5)	89 (5)	4.6 (5)
52J-191 (15 641 5544)	76	0.9	0.7	16 (1)	0.5	0.4	331 (8)	55 (8)	9.5-0.5-0-(8)	2.7 (8)	4,480 (3)	3.7 (3)	79 (3)	4.6 (3)
TOTAL	1,709	23.6	19.4	465	14.7	13.0								

* In averaging these values all H1-H3 intervals were included, whether or not they were in a surficial position.

HUMIFIED PEAT (H4+)									TOTAL PEATLAND					
									PEATLAND CLASSIFICATION					
AVERAGE THICKNESS (cm) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) ($ MOSS /10 - $ SEDGE/10 - $ WOOD/10 - $ OTHER/10) (no. of cores)	WEIGHTED AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE HEAT VALUE (cal/g) (no. of sampled intervals)	WEIGHTED AVERAGE ASH CONTENT ($) (no. of sampled intervals)	WEIGHTED AVERAGE LAB FIBER CONTENT ($) (no. of sampled intervals)	WEIGHTED AVERAGE LAB PH OF PEAT (no. of sampled intervals)	PERCENTAGE OF PEATLAND AREA WITH <10$ TREE COVER	BASAL OOZE cm thick (no. of cores with ooze / total no. of cores)	PEATLAND TYPE	AREA (ha)	AVERAGE DEPTH OF PEAT (m) (no. of cores)	TOTAL PEATLAND STUMP CONTENT ($)	M.N.R ADMINISTRATIVE DISTRICT/ SITE REGION	COMMENTS
293 (59)	8-1-1-0 (59)	4.1 (59)	14,648 (8)	7.5 (8)	57 (8)	15.6 (8)	33	19	OB	38	4.1 (19)	1.0	SIOUX LOOKOUT	Category A
								(5/59)	TB	90	3.4 (12)		/35	fuel peat
									OF	31	2.6 (7)			deposit.
									TF	112	2.6 (26)			
									cS	208	2.6 (9)			
									tS	64	- (0)			
256 (15)	9.5-0.5-1-0(14)	4.2 (14)	14,330 (10)	7.5 (11)	62 (11)	15.7 (11)	29	10	OB	54	2.0 (6)	3.5	SIOUX LOOKOUT	
								(1/15)	TB	13	- (0)		/3W	
									OF	13	- (0)			
									TF	77	2.0 (22)			
									cS	126	1.1 (5)			
									tS	21	1.2 (1)			
329 (27)	8-1-1-0 (27)	4.2 (27)	14,377 (10)	9.3 (10)	39 (10)	16.3 (10)	28	0	OF	21	3.4 (13)	0.3	SIOUX LOOKOUT	Category B
								(0/27)	TF	73	3.5 (14)		/3W	fuel peat
									cS	93	2.6 (6)			deposit.
									tS	14	- (0)			
284 (13)	8-2-0-0 (13)	4.4 (13)	14,565 (9)	6.0 (9)	52 (8)	15.0 (9)	87	60	OB	19	3.1 (7)	0.5	SIOUX LOOKOUT	
								(4/13)	TB	10	1.1 (6)		/3W	
									OPF	22	2.1 (9)			
									TF	2	0.1 (1)			
									cS	20	2.5 (2)			
									tS	3	- (0)			
322 (23)	7-3-0-0 (23)	4.4 (23)	14,652 (11)	5.8 (11)	58 (11)	14.6 (11)	45	70	OB	31	3.1 (14)	0.5	SIOUX LOOKOUT	Category B
								(1/23)	TB	44	3.0 (13)		/3W	fuel peat
									OF	1	- (0)			deposit.
									cS	48	- (0)			
									tS	9	0.1 (1)			
300 (25)	8-1.5-0.5-0(25)	4.1 (25)	14,775 (13)	5.6 (12)	58 (12)	14.7 (12)	>97	49	OB	114	2.9 (31)	0.8	SIOUX LOOKOUT	Category B
								(11/25)	TB	23	3.4 (1)			fuel peat
									OPF	3	1.7 (2)			deposit.
									TF	5	1.6 (1)			
									cS	24	- (0)			
									tS	28	- (0)			
287 (23)	9-1-0-0 (23)	4.2 (23)	14,564 (10)	5.9 (9)	60 (9)	15.2 (9)	88	69	OB	63	2.4 (13)	1.1	SIOUX LOOKOUT	Category B
								(10/23)	TB	32	2.3 (12)		/3W	fuel peat
									OPF	6	2.8 (3)			deposit.
									TPF	7	4.3 (2)			
									OF	5	0.2 (1)			
									TF	2	2.5 (2)			
									cS	40	- (0)			
									tS	4	- (0)			
276 (8)	9-0.5-0.5-0(8)	4.5 (8)	14,863 (4)	8.2 (4)	52 (4)	14.8 (4)	80	150	OB	37	2.2 (14)	0.9	SIOUX LOOKOUT	
								(3/8)	TB	39	1.5 (5)		/3W	

APPENDIX A.3

II) RECONNAISSANCE SURVEY SITES.

AREA: SIOUX LOOKOUT

					UNHUMIFIED PEAT (H1-H3) *		
RECONNAISSANCE STUDY SITE (U.T.M. Grid Reference)	TOTAL PEATLAND AREA (ha) ×	ESTIMATED AVERAGE DEPTH (cm) (no. of cores) =	ESTIMATED TOTAL VOLUME $(\times 10^{6}\ M^{3})$ (In situ)	ESTIMATED VOLUME H4+ $(\times 10^{6}\ M^{3})$ (In situ)	AVERAGE THICKNESS H1-H3 PEAT (cm) (no. of cores)	AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) (% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)
52J-30 (15 678 5644)	179	307 (11)	5,5	4,3	67 (11)	2,9 (10)	9-0-1-0 (10)
52J-45 (15 591 5631)	359	362 (7)	13,0	12,1	26 (7)	2,8 (5)	7-3-0-0 (5)
52J-48 (15 599 5633)	266	227 (10)	6,0	5,2	30 (10)	2,9 (10)	9-1-0-0 (10)
52J-88 (15 670 5613)	113	109 (6)	1,2	1,1	12 (6)	2,3 (5)	8-1-1-0 (5)
52J-90 (15 673 5621)	203	210 (18)	4,3	3,8	23 (18)	2,3 (18)	9-0,5-0,5-0 (18)
52J-110 (15 669 5610)	101	238 (5)	2,4	1,5	86 (5)	2,9 (5)	9-0,5-0,5-0 (5)
52J-111 (15 668 5602)	100	237 (6)	2,4	1,5	43 (6)	2,7 (6)	8-1-1-0 (6)
52J-112 (15 670 5603)	102	178 (9)	1,8	1,5	28 (9)	2,6 (9)	8-2-0-0 (9)
52J-120 (15 618 5583)	121	181 (7)	2,2	2,0	17 (7)	2,6 (7)	9-1-0-0 (7)
52J-145 (15 645 5575)	144	129 (7)	1,9	1,7	9 (7)	3,0 (5)	9-1-0-0 (5)
52J-149 (15 655 5579)	115	140 (6)	1,6	1,6	0 (6)	- (0)	- (0)
52J-169 (15 668 5566)	49	160 (5)	0,8	0,7	16 (5)	2,3 (5)	9-1-0-0 (5)

HUMIFIED PEAT (H4 +)					PEATLAND CLASSIFICATION			
AVERAGE THICKNESS H4+ PEAT PEAT (cm) (no. of cores)	AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) (% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)	PERCENTAGE OF PEATLAND AREA WITH <10% TREE COVER	BASAL OOZE PRESENT (P) OR ABSENT (A)	PEATLAND TYPE	AREA (ha)	AVERAGE DEPTH OF PEAT (m) (no. of cores)	M.N.R ADMINISTRATIVE DISTRICT/ SITE REGION
240 (11)	4,1 (11)	8-1-1-0 (11)	21	A	OF	37	4,1 (6)	SIOUX LOOKOUT/ 3S
					TF	55	1,7 (3)	
					cS	87	2,1 (2)	
336 (7)	4,1 (7)	7-1-2-0 (7)	40	A	OB	7	- (0)	SIOUX LOOKOUT/ 3S
					TB	47	- (0)	
					OF	136	3,7 (6)	
					TF	60	- (0)	
					cS	93	2,5 (1)	
					tS	16	0,7 (1)	
197 (10)	4,2 (10)	8-1-1-0 (10)	41	A	OB	69	2,0 (3)	SIOUX LOOKOUT/ 3S
					TB	88	2,1 (6)	
					OF	40	2,3 (2)	
					cS	66	- (0)	
					tS	3	- (0)	
97 (6)	4,0 (6)	8-0-2-0 (6)	30	A	OF	34	1,5 (1)	SIOUX LOOKOUT/ 3W
					TF	39	1,4 (3)	
					cS	40	0,5 (2)	
187 (18)	4,8 (17)	8-1-1-0 (17)	9	P	OB	5	- (0)	SIOUX LOOKOUT/ 3W
					TB	49	2,8 (8)	
					OF	13	2,6 (2)	
					TF	10	2,5 (2)	
					cS	73	2,1 (1)	
					tS	53	0,9 (4)	
152 (5)	4,0 (5)	9-0-1-0 (5)	21	A	OF	21	2,8 (3)	SIOUX LOOKOUT/ 3W
					TF	10	1,7 (2)	
					cS	70	0,2 (2)	
193 (6)	4,6 (6)	8-1-1-0 (6)	8	A	OF	8	1,0 (1)	SIOUX LOOKOUT/ 3W
					TF	24	2,7 (4)	
					TPF	2	2,5 (1)	
					cS	37	- (0)	
					tS	29	- (0)	
150 (9)	4,9 (9)	8-1-1-0 (9)	15	A	OF	15	- (0)	SIOUX LOOKOUT/ 3W
					TF	29	1,8 (9)	
					cS	47	- (0)	
					tS	11	- (0)	
164 (6)	4,7 (6)	8-1-1-0 (6)	33	A	OB	37	2,1 (4)	SIOUX LOOKOUT/ 3W
					TB	45	2,1 (2)	
					OF	3	- (0)	
					TF	2	0,1 (1)	
					cS	14	- (0)	
					tS	20	- (0)	
120 (7)	4,1 (7)	8-1-1-0 (7)	33	A	OB	48	0,9 (5)	SIOUX LOOKOUT/ 3W
					TB	28	1,7 (3)	
					cS	53	- (0)	
					tS	15	- (0)	
140 (6)	4,3 (6)	9-0-1-0 (6)	3	A	OB	3	- (0)	SIOUX LOOKOUT/ 3W
					TB	35	1,3 (3)	
					TF	32	1,5 (3)	
					cS	35	- (0)	
					tS	10	- (0)	
144 (5)	4,4 (5)	8-1-1-0 (5)	29	P	OB	9	- (0)	SIOUX LOOKOUT/ 3W
					TB	33	1,7 (4)	
					OF	5	1,4 (1)	
					tS	2	- (0)	

APPENDIX A.3

II) RECONNAISSANCE SURVEY SITES (CONTINUED).

AREA: SIOUX LOOKOUT

					UNHUMIFIED PEAT (H1-H3) *		
RECONNAISSANCE STUDY SITE (U.T.M. Grid Reference)	TOTAL PEATLAND AREA (ha) X	ESTIMATED AVERAGE DEPTH (cm) (no. of cores) =	ESTIMATED TOTAL VOLUME $(\times 10^{6}\ M^{3})$ (in situ)	ESTIMATED VOLUME H4+ $(\times 10^{6}\ M^{3})$ (in situ)	AVERAGE THICKNESS H1-H3 PEAT (cm) (no. of cores)	AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) (% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)
52J-169 (15 668 5566)	49	160 (5)	0.8	0.7	16 (5)	2.3 (5)	9-1-0-0 (5)
52J-173 (15 681 5559)	335	233 (8)	7.8	7.2	18 (8)	3.0 (3)	9-1-0-0 (3)
52J-188 (15 619 5542)	58	261 (5)	1.5	1.4	25 (5)	2.6 (4)	10-0-0-0 (5)
TOTAL	2,245		52.4	45.7			

* In averaging these values all H1-H3 intervals were included, whether or not they were in a surficial position.

HUMIFIED PEAT (H4 +)					PEATLAND CLASSIFICATION			
AVERAGE THICKNESS H4+ PEAT PEAT (cm) (no. of cores)	AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) (% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)	PERCENTAGE OF PEATLAND AREA WITH <10% TREE COVER	BASAL OOZE PRESENT (P) OR ABSENT (A)	PEATLAND TYPE	AREA (ha)	AVERAGE DEPTH OF PEAT (m) (no. of cores)	M.N.R ADMINISTRATIVE DISTRICT/ SITE REGION
144 (5)	4.4 (5)	8-1-1-0 (5)	29	P	OB	9	- (0)	SIOUX LOOKOUT/ 3W
					TB	33	1.7 (4)	
					OF	5	1.4 (1)	
					tS	2	- (0)	
215 (8)	4.1 (8)	8-1-1-0 (8)	17	A	OB	50	2.3 (3)	IGNACE/ 3W
					TB	128	1.7 (6)	
					OF	7	- (0)	
					cS	119	- (0)	
					tS	31	- (0)	
236 (5)	4.6 (5)	7-2-1-0 (5)	50	P	OB	29	2.8 (4)	SIOUX LOOKOUT/ 3W
					TB	14	2.1 (1)	
					cS	7	- (0)	
					tS	8	- (0)	

APPENDIX A.4 SUMMARY TABLES FOR PEATLANDS SURVEYED IN IGNACE AREA.

(Refer to Section 3.3 for sources and context of data.)

I) DETAILED SURVEY SITES.

	TOTAL PEATLAND			AREA GREATER THAN 2M DEEP										
								UNHUMIFIED PEAT (H1-H3) *						
DETAILED STUDY SITE (U.T.M. Grid Reference)	TOTAL AREA (ha)	TOTAL VOLUME ($\times 10^{6}$ M^{3}) (in situ)	VOLUME H4+ ($\times 10^{6}$ M^{3}) (in situ)	TOTAL AREA (ha) (no. of basins)	TOTAL VOLUME ($\times 10^{6}$ M^{3}) (in situ)	VOLUME H4+ PEAT ($\times 10^{6}$ M^{3}) (in situ)	AVERAGE DEPTH (cm) (no. of cores)	AVERAGE THICKNESS (cm) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) (% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)	WEIGHTED AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE HEAT VALUE (cal/g) (no. of sampled intervals)	WEIGHTED AVERAGE ASH CONTENT (%) (no. of sampled intervals)	WEIGHTED AVERAGE LAB FIBER CONTENT (%) (no. of sampled intervals)	WEIGHTED AVERAGE LAB PH OF PEAT (no. of sampled intervals)
52G-119 (15 638 5471)	765	12.7	4.6	348 (1)	9.2	4.0	301(117)	149 (117)	6-4-0-0 (116)	2.7 (117)	4,750 (6)	6.0 (6)	51 (6)	4.4 (6)
52G-152 (15 609 5465)	417	4.8	1.2	86 (2)	2.3	0.8	313(33)	145 (33)	7-3-0-0 (33)	2.7 (33)	4,922 (5)	5.6 (5)	58 (5)	4.2 (5)
52G-155 (15 617 5462)	391	6.4	3.6	82 (1)	2.7	2.0	282(30)	86 (30)	8-2-0-0 (30)	2.7 (30)	4,953 (5)	4.2 (5)	60 (5)	4.1 (5)
52G-163 (15 626 5458)	548	4.4	1.1	26 (1)	0.7	0.3	231(11)	104 (11)	6-4-0-0 (11)	2.6 (11)	4,195 (2)	3.9 (2)	56 (2)	3.7 (2)
52G-165 (15 639 5462)	537	11.5	5.8	217 (1)	9.6	5.7	457(67)	181 (67)	7-3-0-0 (67)	2.8 (67)	4,733 (8)	6.3 (8)	60 (9)	4.8 (9)
52G-178 (15 714 5462)	963	10.6	3.9	191 (1)	4.9	3.2	260(44)	96 (44)	8-2-0-0 (44)	2.5 (44)	4,866 (9)	3.4 (10)	58 (10)	4.3 (10)
52G-181 (15 638 5454)	1,709	16.8	4.9	255 (1)	5.5	3.2	269(85)	125 (85)	7-3-0-0 (86)	2.7 (86)	4,889 (5)	6.3 (5)	52 (3)	4.6 (5)
52G-190 (15 661 5447)	1,714	24.4	7.8	462 (2)	16.4	6.9	361(109)	205 (109)	7-3-0-0 (109)	2.8 (109)	4,842 (14)	6.2 (14)	55 (14)	4.7 (14)
52G-191A (15 669 5446)	4,830	54.7	16.7	882 (1)	28.1	11.4	290(166)	154 (166)	6-4-0-0 (164)	2.6 (164)	4,477 (4)	7.0 (4)	66 (4)	4.9 (4)
52G-226 (15 671 5440)	1,977	33.8	14.9	939 (1)	26.7	12.9	282(186)	135 (186)	7-3-0-0 (186)	2.6 (182)	4,732 (8)	3.8 (8)	59 (8)	3.9 (8)
TOTAL	13,851	180.1	64.5	3,488	106.0	50.3								

* In averaging these values all H1-H3 intervals were included, whether or not they were in a surfical position.

HUMIFIED PEAT (H4+)									TOTAL PEATLAND					
									PEATLAND CLASSIFICATION					
AVERAGE THICKNESS (cm) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) (% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)	WEIGHTED AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE HEAT VALUE (cal/g) (no. of sampled intervals)	WEIGHTED AVERAGE ASH CONTENT (%) (no. of sampled intervals)	WEIGHTED AVERAGE LAB FIBER CONTENT (%) (no. of sampled intervals)	WEIGHTED AVERAGE LAB PH OF PEAT (no. of sampled intervals)	PERCENTAGE OF PEATLAND AREA WITH <10% TREE COVER	BASAL OOZE cm thick (no. of cores with ooze / total no. of cores)	PEATLAND TYPE	AREA (ha)	AVERAGE DEPTH OF PEAT (m) (no. of cores)	TOTAL PEATLAND STUMP CONTENT (%)	M.N.R ADMINISTRATIVE DISTRICT/ SITE REGION	COMMENTS
152 (117)	3-7-0-0 (115)	4.3 (114)	4,951 (4)	8.4 (5)	52 (5)	4.3 (5)	51	18 (11/117)	OB TB OF TF cS	25 448 196 44 52	3.0 (7) 2.9 (67) 2.5 (61) 1.5 (5) 2.0 (3)	0.4	IGNACE/ 3W	Category A fuel peat deposit.
168 (33)	6-4-0-0 (33)	4.5 (32)	4,820 (5)	10.1 (5)	36 (5)	4.6 (5)	35	25 (2/33)	OB TB OF TF	136 218 44 19	3.5 (15) 2.0 (33) 1.1 (6) 2.7 (1)	1.0	IGNACE/ 3W	Category B fuel and horticultural peat deposit.
196 (30)	4-6-0-0 (30)	4.2 (30)	4,872 (1)	6.9 (1)	42 (1)	4.4 (1)	22	20 (1/30)	OB TB OF TF M	26 243 56 50 16	2.8 (5) 2.1 (44) 1.8 (8) - (0) - (0)	1.9	IGNACE/ 3W	Category B fuel peat deposit.
127 (11)	5-5-0-0 (11)	4.4 (11)	5,037 (5)	8.0 (5)	37 (5)	4.1 (5)	47	0 (0/11)	OB TB OF cS M	113 299 27 62 47	1.2 (34) 1.5 (22) 1.6 (6) - (0) - (0)	1.7	IGNACE/ 3W	
276 (67)	6-4-0-0 (66)	4.3 (66)	4,797 (6)	7.7 (6)	56 (6)	5.0 (6)	19	15 (8/67)	TB OF TF cS M	281 112 85 53 6	4.0 (50) 5.2 (13) 3.3 (8) 2.0 (2) 4.6 (2)	0.2	IGNACE/ 3W	Category A fuel and horticultural peat deposit.
170 (44)	7-3-0-0 (44)	4.1 (44)	4,898 (1)	2.7 (1)	49 (1)	3.8 (1)	12	50 (1/44)	OB TB OF TF cS M	47 365 44 411 57 39	2.1 (12) 2.2 (43) 2.2 (10) 2.4 (2) - (0) - (0)	1.2	THUNDER BAY/ 3W	Category A fuel peat deposit.
145 (85)	3-7-0-0 (79)	4.6 (77)	4,749 (6)	11.1 (6)	51 (5)	4.9 (6)	49	0 (0/85)	OB TB OF TF cS M	52 451 841 185 155 25	2.6 (3) 1.9 (75) 1.4 (178) 0.6 (3) 0.3 (2) - (0)	0.4	IGNACE/ 3W	Category A fuel peat deposit.
156 (109)	5-5-0-0 (107)	4.3 (106)	4,759 (13)	7.3 (13)	43 (13)	4.8 (13)	82	23 (10/109)	OB TB OF TF cS tS M	367 552 432 13 306 11 35	3.1 (46) 1.0 (58) 3.4 (48) - (0) 2.7 (2) - (0) - (0)	0.4	THUNDER BAY/ 3W	Category A fuel peat deposit.
138 (138)	5-5-0-0 (164)	4.3 (164)	5,016 (8)	8.6 (8)	44 (8)	4.6 (8)	72	12 (4/166)	OB TB OF TF cS tS M	1460 1126 1237 307 319 113 226	2.2 (131) 2.1 (48) 2.1 (61) 4.0 (15) 2.5 (1) 2.5 (1) - (0)	0.5	THUNDER BAY/ 3W	Category A fuel peat deposit.
147 (147)	7-3-0-0 (180)	4.3 (173)	4,861 (4)	3.6 (4)	48 (4)	4.1 (4)	47	29 (25/186)	OB TB OF TF cS tS M	429 763 171 379 90 23 122	2.8 (64) 2.7 (76) 2.9 (22) 2.6 (36) - (0) 1.5 (1) - (0)	1.3	THUNDER BAY/ 3W	Category A fuel and horticultural peat deposit.

APPENDIX A.4
II) RECONNAISSANCE SURVEY SITES.

AREA: IGNACE

RECONNAISSANCE STUDY SITE (U.T.M. Grid Reference)	TOTAL PEATLAND AREA (ha) X	ESTIMATED AVERAGE DEPTH (cm) (no. of cores) =	ESTIMATED TOTAL VOLUME (x10^{6} M^{3}) (in situ)	ESTIMATED VOLUME H4+ (x10^{6} M^{3}) (in situ)	UNHUMIFIED PEAT (H1-H3) * AVERAGE THICKNESS H1-H3 PEAT (cm) (no. of cores)	UNHUMIFIED PEAT (H1-H3) * AVERAGE HUMIFICATION (von Post scale) (no. of cores)	UNHUMIFIED PEAT (H1-H3) * WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) (% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)
52G-53 (15 688 5505)	275	245 (4)	6.7	3.2	128 (4)	2.9 (4)	7-3-0-0 (4)
52G-57 (15 698 5502)	315	199 (7)	6.3	4.0	73 (7)	2.5 (7)	8.5-1.5-0-0 (7)
52G-61 (15 606 5487)	919	244 (15)	22.4	9.8	137 (15)	2.7 (15)	9-1-0-0 (15)
52G-75 (15 661 5495)	293	502 (5)	14.7	6.7	274 (5)	2.9 (5)	7-3-0-0 (5)
52G-76 (15 663 5498)	351	298 (6)	10.5	5.9	130 (6)	2.8 (6)	9-1-0-0 (6)
52G-111 (15 626 5475)	750	251 (7)	18.8	9.8	120 (7)	2.5 (7)	7-3-0-0 (7)
52G-114 (15 631 5476)	437	296 (7)	12.9	5.6	167 (7)	2.8 (7)	5-5-0-0 (7)
52G-126 (15 662 5475)	413	255 (6)	10.5	5.7	117 (6)	2.6 (6)	4-6-0-0 (6)
52G-130 (15 670 5485)	421	258 (5)	10.9	5.1	138 (5)	3.0 (5)	9-1-0-0 (5)
52G-166 (15 647 5461)	557	258 (5)	14.4	6.7	138 (5)	2.9 (5)	9-1-0-0 (5)
52G-168 (15 652 5467)	946	320 (1)	30.3	26.5	40 (1)	2.0 (1)	- (0)

HUMIFIED PEAT (H4 +)					PEATLAND CLASSIFICATION			
AVERAGE THICKNESS H4+ PEAT PEAT (cm) (no. of cores)	AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) (% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)	PERCENTAGE OF PEATLAND AREA WITH <10% TREE COVER	BASAL OOZE PRESENT (P) OR ABSENT (A)	PEATLAND TYPE	AREA (ha)	AVERAGE DEPTH OF PEAT (m) (no. of cores)	M.N.R ADMINISTRATIVE DISTRICT/ SITE REGION
118 (4)	4.1 (4)	7-2-1-0 (4)	0	A	TF	123	2.4 (4)	THUNDER BAY/ 3W
					cS	152	- (0)	
126 (7)	4.2 (7)	8-2-0-0 (7)	43	A	OB	40	2.1 (5)	THUNDER BAY/ 3W
					TB	181	- (0)	
					OF	94	1.8 (2)	
107 (15)	4.1 (14)	8-2-0-0 (14)	33	A	OB	55	- (0)	IGNACE/ 3W
					TB	545	2.8 (11)	
					OF	264	2.5 (1)	
					TF	55	1.1 (3)	
228 (5)	4.1 (5)	7-3-0-0 (5)	50	A	OB	48	- (0)	IGNACE/ 3W
					TB	102	5.1 (3)	
					OF	118	4.8 (2)	
					cS	25	- (0)	
168 (6)	4.2 (6)	8-2-0-0 (6)	16	A	OB	13	- (0)	IGNACE/ 3W
					TB	132	3.1 (5)	
					OF	43	- (0)	
					TF	30	2.5 (1)	
					cS	133	- (0)	
131 (7)	3.9 (7)	5-5-0-0 (7)	63	A	OB	312	1.1 (2)	IGNACE/ 3W
					TB	80	2.3 (3)	
					OF	238	- (0)	
					TF	49	4.2 (2)	
					cS	50	- (0)	
					M	21	- (0)	
129 (7)	4.4 (7)	4-6-0-0 (7)	2	A	TB	206	3.2 (4)	IGNACE/ 3W
					OF	7	- (0)	
					TF	68	2.6 (3)	
					cS	153	- (0)	
					tS	3	- (0)	
138 (6)	4.2 (6)	3-7-0-0 (6)	54	A	OB	126	1.8 (1)	THUNDER BAY/ 3W
					TB	135	- (0)	
					OF	97	2.7 (5)	
					TF	5	- (0)	
					cS	38	- (0)	
					tS	1	- (0)	
					M	11	- (0)	
120 (5)	4.8 (5)	8-2-0-0 (5)	52	A	OB	94	3.2 (4)	IGNACE/ 3W
					TB	5	- (0)	
					OF	126	0.7 (1)	
					TF	9	- (0)	
					cS	187	- (0)	
120 (5)	4.8 (4)	8-2-0-0 (5)	10	A	OB	54	2.6 (2)	THUNDER BAY/ 3W
					TB	174	2.6 (3)	
					TF	118	- (0)	
					cS	68	- (0)	
					tS	13	- (0)	
					M	130	- (0)	
280 (1)	4.6 (1)	7-2-1-0 (1)	62	A	OB	503	3.2 (1)	IGNACE/ 3W
					TB	132	- (0)	
					OF	83	- (0)	
					TF	80	- (0)	
					cS	66	- (0)	
					M	82	- (0)	

APPENDIX A.4

II) RECONNAISSANCE SURVEY SITES (CONTINUED).

AREA: IGNACE

					UNHUMIFIED PEAT (H1-H3) *		
RECONNAISSANCE STUDY SITE (U.T.M. Grid Reference)	TOTAL PEATLAND AREA (ha) X	ESTIMATED AVERAGE DEPTH (cm) (no. of cores) =	ESTIMATED TOTAL VOLUME (x10^6 M^3) (in situ)	ESTIMATED VOLUME H4+ (x10^6 M^3) (in situ)	AVERAGE THICKNESS H1-H3 PEAT (cm) (no. of cores)	AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) ($ MOSS /10 - $ SEDGE/10 - $ WOOD/10 - $ OTHER/10) (no. of cores)
52G-176 (15 685 5459)	744	130 (6)	9.7	2.6	95 (6)	2.5 (6)	6-4-0-0 (6)
52G-185 (15 653 5453)	338	149 (13)	5.1	2.1	92 (13)	2.8 (13)	7-3-0-0 (13)
52G-195 (15 688 5444)	1,386	141 (16)	19.5	5.0	114 (16)	2.8 (16)	8-2-0-0 (16)
52G-198 (15 694 5442)	388	268 (5)	10.4	2.6	200 (5)	2.9 (5)	9-1-0-0 (5)
52G-205 (15 713 5453)	431	367 (5)	15.8	10.0	44 (5)	2.3 (5)	9-1-0-0 (5)
52G-208 (15 652 5444)	666	346 (7)	23.0	11.5	173 (7)	2.8 (7)	6-4-0-0 (7)
52G-210 (15 660 5444)	434	339 (13)	14.7	8.9	134 (13)	2.8 (13)	8-2-0-0 (13)
TOTAL	4,731		128.1	62.5			

* In averaging these values all H1-H3 intervals were included, whether or not they were in a surfical position.

HUMIFIED PEAT (H4 +)					PEATLAND CLASSIFICATION			
AVERAGE THICKNESS H4+ PEAT PEAT (cm) (no. of cores)	AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) (% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)	PERCENTAGE OF PEATLAND AREA WITH <10% TREE COVER	BASAL OOZE PRESENT (P) OR ABSENT (A)	PEATLAND TYPE	AREA (ha)	AVERAGE DEPTH OF PEAT (m) (no. of cores)	M.N.R ADMINISTRATIVE DISTRICT/ SITE REGION
35 (6)	4.1 (6)	3-7-0-0 (6)	38	A	TB	149	- (0)	THUNDER BAY/ 3W
					OF	284	1.3 (6)	
					TF	249	- (0)	
					cS	44	- (0)	
					M	18	- (0)	
62 (13)	4.1 (12)	6-4-0-0 (12)	20	A	TB	190	1.6 (11)	THUNDER BAY/ 3W
					OF	67	1.1 (2)	
					TF	3	- (0)	
					cS	78	- (0)	
27 (16)	4.2 (12)	6-4-0-0 (12)	7	A	OB	36	- (0)	THUNDER BAY/ 3W
					TB	421	1.8 (5)	
					OF	64	- (0)	
					TF	492	1.2 (10)	
					cS	288	- (0)	
					M	85	1.0 (1)	
68 (5)	4.9 (5)	10-0-0-0 (5)	0	A	TB	185	2.7 (5)	THUNDER BAY/ 3W
					TF	32	- (0)	
					cS	154	- (0)	
					M	17	- (0)	
232 (5)	4.0 (5)	7-2-1-0 (5)	33	A	OB	48	- (0)	THUNDER BAY/ 3W
					TB	80	4.0 (1)	
					OF	92	2.7 (3)	
					TF	18	- (0)	
					cS	104	1.8 (1)	
					UTILIZED	89	- (0)	
173 (7)	4.0 (7)	4-6-0-0 (7)	21	A	OB	102	3.4 (4)	THUNDER BAY, IGNACE/ 3W
					TB	287	3.5 (3)	
					OF	35	- (0)	
					TF	77	- (0)	
					cS	148	- (0)	
					M	17	- (0)	
205 (13)	4.1 (13)	7-3-0-0 (13)	22	P	OB	43	3.6 (3)	THUNDER BAY/ 3W
					TB	225	3.4 (8)	
					OF	51	3.1 (2)	
					TF	53	- (0)	
					cS	62	- (0)	

APPENDIX A.5 SUMMARY TABLES FOR PEATLANDS SURVEYED IN ARMSTRONG AREA.

(Refer to Section 3.3 for sources and context of data.)

I) DETAILED SURVEY SITES.

	TOTAL PEATLAND			AREA GREATER THAN 2M DEEP										
								UNHUMIFIED PEAT (H1-H3) *						
DETAILED STUDY SITE (U.T.M. Grid Reference)	TOTAL AREA (ha)	TOTAL VOLUME (x10^{6} M^{3}) (in situ)	VOLUME H4+ (x10^{6} M^{3}) (in situ)	TOTAL AREA (ha) (no. of basins)	TOTAL VOLUME (x10^{6} M^{3}) (in situ)	VOLUME H4+ PEAT (x10^{6} M^{3}) (in situ)	AVERAGE DEPTH (cm) (no. of cores)	AVERAGE THICKNESS (cm) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) (% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)	WEIGHTED AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE HEAT VALUE (cal/g) (no. of sampled intervals)	WEIGHTED AVERAGE ASH CONTENT (%) (no. of sampled intervals)	WEIGHTED AVERAGE LAB FIBER CONTENT (%) (no. of sampled intervals)	WEIGHTED AVERAGE LAB PH OF PEAT (no. of sampled intervals)
521-46 (16 377 5586)	674	13.9	2.2	346 (1)	12.7	1.3	366 (30)	330 (30)	4-3-3-0 (29)	2.4 (29)	14,781 (10)	3.5 (10)	34 (10)	4.3 (10)
521-91 (16 344 5576)	296	6.7	1.7	38 (2)	1.1	0.3	279 (25)	206 (25)	5-3-2-0 (25)	2.4 (25)	14,650 (4)	4.9 (4)	37 (4)	4.8 (4)
521-103 (16 364 5575)	622	3.9	1.4	73 (1)	2.1	0.9	292 (30)	164 (30)	6-3-1-0 (30)	2.5 (30)	14,758 (2)	12.5 (2)	25 (2)	5.8 (2)
521-110 (16 392 5573)	184	1.5	0.1	13 (1)	0.3	< 0.1	240 (25)	230 (25)	4-3-3-0 (13)	2.3 (13)	14,957 (2)	5.6 (2)	23 (2)	6.1 (2)
521-129 (16 377 5571)	285	6.8	0.3	77 (1)	1.9	0.1	244 (23)	234 (23)	2-4-4-0 (23)	2.4 (23)	14,130 (2)	13.3 (2)	28 (2)	6.5 (2)
521-169 (16 376 5565)	808	2.7	0.4	40 (1)	0.8	0.2	188 (20)	168 (20)	3-4-3-0 (20)	2.3 (20)	14,816 (2)	7.9 (2)	19 (2)	5.7 (2)
TOTAL	2,869	35.5	6.1	588	18.9	2.9								

* In averaging these values all H1-H3 intervals were included, whether or not they were in a surfical position.

HUMIFIED PEAT (H4+)									TOTAL PEATLAND					
									PEATLAND CLASSIFICATION					
AVERAGE THICKNESS (cm) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) (% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)	WEIGHTED AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE HEAT VALUE (cal/g) (no. of sampled intervals)	WEIGHTED AVERAGE ASH CONTENT (%) (no. of sampled intervals)	WEIGHTED AVERAGE LAB FIBER CONTENT (%) (no. of sampled intervals)	WEIGHTED AVERAGE LAB PH OF PEAT (no. of sampled intervals)	PERCENTAGE OF PEATLAND AREA WITH <10% TREE COVER	BASAL OOZE cm thick (no. of cores with ooze / total no. of cores)	PEATLAND TYPE	AREA (ha)	AVERAGE DEPTH OF PEAT (m) (no. of cores)	TOTAL PEATLAND STUMP CONTENT (%)	M,N,R ADMINISTRATIVE DISTRICT/ SITE REGION	COMMENTS
36 (30)	3-3-4-0 (19)	4,0 (15)	-	-	-	-	53	0	OB	70	3,8 (21)	3,1	NIPIGON/ 3W	Category A fuel peat deposit,
								(0/30)	TB	300	3,8 (16)			
									OF	80	3,8 (9)			
									TF	270	3,8 (2)			
73 (25)	3-2-5-0 (36)	4,2 (36)	5,005 (4)	2,7 (3)	40 (4)	4,2 (4)	100	0	OB	110	2,5 (17)	2,6	NIPIGON/ 3W	
								(0/25)	TB	180	2,3 (38)			
									OF	15	1,8 (11)			
									TF	215	- (0)			
128 (30)	5-3-2-0 (27)	4,5 (27)	-	-	-	-	27	0	OB	55	1,9 (4)	2,5	NIPIGON/ 3W	Category B fuel peat deposit,
								(0/30)	TB	150	2,8 (31)			
									OF	70	1,8 (12)			
									TF	225	2,5 (4)			
10 (25)	5-2-3-0 (8	4,0 (8)	-	-	-	-	44	0	OB	15	1,8 (9)	3,5	NIPIGON/ 3W	
								(0/25)	TB	50	1,7 (10)			
									OF	65	1,8 (6)			
									TF	170	1,8 (16)			
10 (23)	1-1-8-0 (8	4,0 (8)	-	-	-	-	28	0	OB	2	- (0)	3,8	NIPIGON/ 3W	
								(0/23)	TB	90	2,2 (8)			
									OF	30	2,4 (19)			
									TF	190	2,2 (2)			
45 (20)	2-3-5-0 (20)	4,1 (18)	-	-	-	-	20	0	OB	10	2,0 (9)	2,9	NIPIGON/ 3W	
								(0/20)	TB	300	1,8 (13)			
									OF	45	1,6 (36)			
									TF	525	- (0)			

** The total peatland areas exceed the area surveyed for volume calculations, shown on the extreme left,

APPENDIX A.5

II) RECONNAISSANCE SURVEY SITES.

AREA: ARMSTRONG

					UNHUMIFIED PEAT (H1-H3) *		
RECONNAISSANCE STUDY SITE (U.T.M. Grid Reference)	TOTAL PEATLAND AREA (ha)	X ESTIMATED AVERAGE DEPTH (cm) (no. of cores)	= ESTIMATED TOTAL VOLUME $(x10^{6}\ M^{3})$ (in situ)	ESTIMATED VOLUME H4+ $(x10^{6}\ M^{3})$ (in situ)	AVERAGE THICKNESS H1-H3 PEAT (cm) (no. of cores)	AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) (% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)
521/7 (16 344 5594)	128	273 (2)	3.4	2.2	105 (2)	1.9 (2)	6.5-2-1.5-0 (2)
521/43 (16 345 5586)	72	165 (1)	1.2	0.3	120 (1)	1.8 (1)	6-4-0-0 (1)
521/48 (16 324 5577)	52	140 (1)	0.3	0.0	140 (1)	2.4 (1)	6-3-1-0 (1)
521/53 (16 337 5583)	87	425 (1)	3.7	1.9	210 (1)	2.3 (1)	4-2.5-3.5-0 (1)
521/81 (16 339 5577)	105	330 (1)	3.5	0.3	300 (1)	2.6 (1)	4-4-2-C (1)
521/86 (16 324 5577)	45	230 (1)	1.0	0.5	120 (1)	1.9 (1)	5.5-4-0.5-0 (1)
521/95 (16 335 5576	40	500 (1)	2.0	1.3	180 (1)	2.5 (1)	5-2-3-0 (1)
521/140 (16 388 5569	109	120 (1)	1.3	0.0	120 (1)	1.5 (1)	6-3-1-0 (1)
TOTAL	638		16.4	6.4			

* in averaging these values all H1-H3 intervals were included whether or not they were in a surficial position.

HUMIFIED PEAT (H4 +)					PEATLAND CLASSIFICATION			
AVERAGE THICKNESS H4+ PEAT PEAT (cm) (no. of cores)	AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) ($ MOSS /10 - $ SEDGE/10 - $ WOOD/10 - $ OTHER/10) (no. of cores)	PERCENTAGE OF PEATLAND AREA WITH <10$ TREE COVER	BASAL OOZE PRESENT (P) OR ABSENT (A)	PEATLAND TYPE	AREA (ha) **	AVERAGE DEPTH OF PEAT (m) (no. of cores)	M.N.R ADMINISTRATIVE DISTRICT/ SITE REGION
168 (2)	4.5 (2)	5.5-2-2.5-0 (2)	19	A	OB	40	2.7 (2)	NIPIGON/ 3W
					TB	87	- (0)	
					OF	24	- (0)	
					TF	11	- (0)	
					TS	5	- (0)	
45 (1)	4.3 (1)	6-3.5-0.5-0 (1)	100	A	OB	21	1.7 (1)	NIPIGON/ 3W
					OF	51	- (0)	
0 (1)	- (0)	- (0)	38	A	OB	16	- (0)	NIPIGON/ 3W
					TB	32	- (0)	
					OF	4	1.4 (1)	
215 (1)	4.0 (1)	6-2-2-0 (1)	9	A	TB	79	- (0)	NIPIGON/ 3W
					OF	8	4.2 (1)	
30 (1)	4.0 (1)	1-6-3-0 (1)	94	A	OB	45	3.3 (1)	NIPIGON/ 3W
					TB	3	- (0)	
					OF	53	- (0)	
					TF	3	- (0)	
110 (1)	4.5 (1)	3.5-2.5-4-0 (1)	87	A	OB	33	2.3 (1)	NIPIGON/ 3W
					TB	6	(0)	
					OF	7	- (0)	
320 (1)	4.4 (1)	4-4-2-0 (1)	0	A	TB	28	5 (1)	NIPIGON/ 3W
					TF	12	- (0)	
0 (1)	- (0)	- (0)	45	A	TB	60	- (0)	NIPIGON/ 3W
					OF	50	1.2 (1)	

** The total peatland areas exceed the areas surveyed for volume calculations, shown on the extreme left.

APPENDIX A.6 SUMMARY TABLES FOR PEATLANDS SURVEYED IN LONGLAC-NAKINA AREA.

(Refer to Section 3.3 for sources and context of data.)

I) DETAILED SURVEY SITES.

	TOTAL PEATLAND			AREA GREATER THAN 2M DEEP										
								UNHUMIFIED PEAT (H1-H3) *						
DETAILED STUDY SITE (U.T.M. Grid Reference)	TOTAL AREA (ha)	TOTAL VOLUME (x10^{6} M^{3}) (in situ)	VOLUME H4+ (x10^{6} M^{3}) (in situ)	TOTAL AREA (ha) (no. of basins)	TOTAL VOLUME (x10^{6} M^{3}) (in situ)	VOLUME H4+ PEAT (x10^{6} M^{3}) (in situ)	AVERAGE DEPTH (cm) (no. of cores)	AVERAGE THICKNESS (cm) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) (\$ MOSS /10 - \$ SEDGE/10 - \$ WOOD/10 - \$ OTHER/10) (no. of cores)	WEIGHTED AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE HEAT VALUE (cal/g) (no. of sampled intervals)	WEIGHTED AVERAGE ASH CONTENT (\$) (no. of sampled intervals)	WEIGHTED AVERAGE LAB FIBER CONTENT (\$) (no. of sampled intervals)	WEIGHTED AVERAGE LAB PH OF PEAT (no. of sampled intervals)
42E-46 (16 548 5531)	827	12.7	3.9	344 (1)	9.2	3.0	269 (80)	179 (80)	7-2-1-0 (80)	3.0 (80)	4,383 (4)	8.4 (4)	65 (4)	6.7 (4)
42E-65 (16 513 5513)	803	14.3	5.7	358 (1)	10.1	4.8	294 (98)	155 (98)	7-2-1-0 (94)	3.0 (94)	4,621 (3)	6.6 (3)	63 (3)	6.6 (3)
42E-69 (16 517 5515)	333	5.9	2.3	157 (1)	4.0	2.0	282 (50)	143 (50)	6-3-1-0 (50)	2.8 (50)	4,380 (2)	7.5 (2)	46 (2)	6.2 (2)
42E-72 (16 525 5514)	212	2.0	0.4	45 (1)	1.2	0.3	270 (17)	191 (17)	7-2-1-0 (17)	3.0 (17)	4,437 (4)	7.6 (4)	67 (4)	6.3 (4)
42E-80 (16 555 5521)	569	9.1	4.0	179 (2)	4.3	2.2	248 (59)	122 (59)	7.5-1-1.5-0 (54	3.0 (54)	4,228 (4)	9.0 (5)	58 (5)	6.5 (5)
42E-95 (16 498 5509)	507	4.2	1.8	55 (1)	1.3	0.7	311 (24)	91 (24)	7-2-1-0 (24)	3.0 (24)	-	-	-	-
42E-99 (16 506 5508)	244	3.1	1.5	71 (1)	2.0	1.2	303 (22)	113 (22)	8-2-0-0 (22)	3.0 (22)	4,643 (1)	6.2 (1)	63 (1)	6.4 (1)
42E-134 (16 475 5495)	271	3.4	1.0	89 (1)	2.1	0.7	289 (25)	160 (25)	7-0-3-0 (25)	3.0 (25)	4,324 (2)	8.6 (2)	57 (2)	6.0 (2)
42L-170 (16 509 5559)	355	5.7	2.1	164 (1)	4.6	1.9	280 (47)	163 (47)	7-1.5-1.5-0 (47)	3.0 (47)	4,164 (2)	8.5 (3)	47 (3)	6.3 (3)
42L-264 (16 518 5552)	332	6.0	2.2	140 (1)	3.8	1.8	293 (56)	149 (56)	6-3-1-0 (54)	3.0 (54)	4,480 (4)	6.5 (4)	62 (4)	6.1 (4)
TOTAL	14,653	66.3	25.0	1,602	42.4	18.6								

* In averaging these values all H1-H3 intervals were included, whether or not they were in a surficial position.

HUMIFIED PEAT (H4+)									TOTAL PEATLAND					
									PEATLAND CLASSIFICATION					
AVERAGE THICKNESS (cm) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) (% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)	WEIGHTED AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE HEAT VALUE (cal/g) (no. of sampled intervals)	WEIGHTED AVERAGE ASH CONTENT (%) (no. of sampled intervals)	WEIGHTED AVERAGE LAB FIBER CONTENT (%) (no. of sampled intervals)	WEIGHTED AVERAGE LAB PH OF PEAT (no. of sampled intervals)	PERCENTAGE OF PEATLAND AREA WITH <10% TREE COVER	BASAL OOZE cm thick (no. of cores with ooze / total no. of cores)	PEATLAND TYPE	AREA (ha)	AVERAGE DEPTH OF PEAT (m) (no. of cores)	TOTAL PEATLAND STUMP CONTENT (%)	M.N.R ADMINISTRATIVE DISTRICT/ SITE REGION	COMMENTS
90 (80)	8-1-1-0 (78)	4.3 (78)	4,612 (3)	9.2 (3)	42 (3)	6.4 (3)	100	0 (0/80)	OB	136	2.9 (25)	0.2	GERALDTON/ 3W	Category A fuel peat deposit
									TB	6	- (0)			
									OF	123	2.4 (20)			
									TF	391	2.0 (62)			
									cS	107	0.3(1)			
									M	64	- (0)			
139 (98)	7.5-2-0.5-0 (92	4.3 (92)	4,327 (5)	10.5 (5)	44 (5)	6.4 (5)	57	23 (12/98)	OB	47	2.7 (12)		GERALDTON/ 3W	Category A fuel peat deposit
									TB	34	3.1 (7)			
									TPF	5	- (0)			
									OF	284	2.8 (62)			
									TF	342	2.2 (40)			
									cS	53	1.0 (2)			
									tS	7	- (0)			
									M	31	- (0)			
139 (50)	7-2-1-0 (44)	4.2 (44)	4,277 (4)	8.9 (4)	45 (4)	6.1 (4)	96	0 (0/50)	OB	4	- (0)	0.3	GERALDTON/ 3W	Category A fuel peat deposit
									OF	170	2.5 (55)			
									TF	129	1.8 (19)			
									cS	20	- (0)			
									M	2	- (0)			
79 (17)	8-1-1-0 (13)	4.0 (13)	4,060 (2)	13.0 (2)	41 (2)	6.5 (2)	>96	68 (11/17)	OF	78	2.4 (22)	0.4	GERALDTON/ 3W	
									TF	37	- (0)			
									cS	77	- (0)			
									hS	10	- (0)			
									M	10	- (0)			
126 (59)	8-1-1-0 (57)	4.5 (57)	4,321 (4)	9.2 (4)	42 (4)	6.4 (4)	81	0 (0/59)	OB	7	- (0)	0.8	GERALDTON/ 3W	Category A fuel peat deposit
									TB	22	2.7 (4)			
									OF	269	2.2 (65)			
									TF	135	2.2 (30)			
									cS	79	1.0 (1)			
									tS	3	- (0)			
									M	54	- (0)			
220 (24)	8-1-1-0 (24)	4.3 (24)	4,401 (4)	9.8 (4)	47 (4)	6.4 (4)	92	10 (1/24)	OF	157	1.9 (37)	0.3	GERALDTON/ 3W	Category B fuel peat deposit
									TF	149	1.5 (21)			
									cS	186	- (0)			
									tS	1	- (0)			
									M	14	- (0)			
190 (22)	8-1.5-0.5-0 (22	4.1 (22)	4,310 (4)	8.9 (4)	44 (4)	6.7 (4)	94	10 (1/22)	OF	135	2.9 (23)	0.1	GERALDTON/ 3W	Category B fuel peat deposit
									TF	90	1.0 (4)			
									cS	15	- (0)			
									M	4	- (0)			
129 (25)	8-1-1-0 (22)	4.4 (22)	4,166 (2)	11.5 (2)	39 (2)	5.8 (2)	93	30 (2/25)	OB	29	1.7 (3)	0.8	GERALDTON/ 3W	Category B fuel peat deposit
									OF	108	2.6 (27)			
									TF	71	1.2 (13)			
									cS	61	- (0)			
									tS	1	- (0)			
									M	1	- (0)			
117 (47)	8-1-1-0 (46)	4.2 (46)	4,095 (3)	10.1 (2)	47 (2)	6.2 (2)	72	15 (2/47)	OF	124	2.7 (40)	0.5	GERALDTON/ 3W	Category A fuel peat deposit
									TF	71	2.4 (18)			
									hS	5	- (0)			
									cS	146	- (0)			
									M	9	- (0)			
144 (56)	8-1-1-0 (56)	4.4 (56)	4,008 (1)	11.6 (1)	54 (1)	6.6 (1)	23	0 (0/56)	OB	5	2.9 (3)	0.5	GERALDTON/ 3W	
									OF	204	1.9 (41)			
									TF	195	2.5 (43)			
									cS	109	0.9 (1)			
									M	19	- (0)			

APPENDIX A.6

II) RECONNAISSANCE SURVEY SITES.

AREA: LONGLAC - NAKINA

					UNHUMIFIED PEAT (H1-H3) *		
RECONNAISSANCE STUDY SITE (U.T.M. Grid Reference)	TOTAL PEATLAND AREA (ha) X	ESTIMATED AVERAGE DEPTH (cm) (no. of cores) =	ESTIMATED TOTAL VOLUME (x10^{6} M^{3}) (in situ)	ESTIMATED VOLUME H4+ (x10^{6} M^{3}) (in situ)	AVERAGE THICKNESS H1-H3 PEAT (cm) (no. of cores)	AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) ($ MOSS /10 - $ SEDGE/10 - $ WOOD/10 - $ OTHER/10) (no. of cores)
42E-1 (16 432 5537)	341	265 (4)	9.0	3.9	153 (4)	3.0 (4)	7-0-3-0 (4)
42E-51 (16 447 5524)	166	128 (4)	2.1	0.9	73 (4)	3.0 (4)	7-1-2-0 (4)
42E-57 (16 469 5519)	80	173 (4)	1.4	0.7	83 (4)	3.0 (4)	7-2-1-0 (4)
42E-64 (16 509 5512)	583	293 (3)	17.1	9.3	133 (3)	3.0 (3)	5-5-0-0 (3)
42E-73 (16 528 5516)	208	295 (4)	6.1	2.1	195 (4)	3.0 (4)	6-2.5-1.5-0 (4)
42E-77 (16 543 5516)	450	219 (4)	9.9	5.5	98 (4)	2.8 (4)	6-3-1-0 (4)
42E-88 (16 478 5510)	71	350 (2)	2.5	2.1	55 (2)	3.0 (2)	8-1.5-0.5-0 (2)
42E-89 (16 487 5501)	158	370 (4)	5.9	3.1	178 (4)	3.0 (3)	7-2-1-0 (4)
42E-92 (16 496 5504)	146	347 (3)	5.0	2.8	153 (3)	3.0 (4)	8-1-1-0 (3)
42E-97 (16 500 5508)	133	240 (3)	3.2	1.9	98 (3)	2.8 (3)	9-0-1-0 (3)
42E-98 (16 502 5509)	182	360 (4)	6.6	4.4	120 (4)	2.7 (4)	8-2-0-0 (4)
42E-122 (16 555 5501)	139	107 (3)	1.5	0.9	44 (3)	3.0 (2)	3.5-6.5-0-0 (2)

HUMIFIED PEAT (H4 +)					PEATLAND CLASSIFICATION			
AVERAGE THICKNESS H4+ PEAT PEAT (cm) (no. of cores)	AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) ($ MOSS /10 - $ SEDGE/10 - $ WOOD/10 - $ OTHER/10) (no. of cores)	PERCENTAGE OF PEATLAND AREA WITH <10$ TREE COVER	BASAL OOZE PRESENT (P) OR ABSENT (A)	PEATLAND TYPE	AREA (ha)	AVERAGE DEPTH OF PEAT (m) (no. of cores)	M.N.R ADMINISTRATIVE DISTRICT/ SITE REGION
113 (4)	4,0 (4)	8-0-2-0 (4)	31	A	OB	6	- (0)	NIPIGON/ 3W
					OF	100	2,7 (2)	
					TF	161	2,6 (2)	
					cS	24	- (0)	
					tS	50	- (0)	
55 (4)	4,0 (4)	8-0-2-0 (4)	22	A	TB	23	- (0)	NIPIGON/ 3W
					OF	32	- (0)	
					TF	72	1,3 (4)	
					cS	31	- (0)	
					tS	8	- (0)	
90 (4)	4,0 (3)	8-1-1-0 (3)	44	A	OF	28	1,4 (2)	NIPIGON/ 3W
					TF	48	2,1 (2)	
					tS	4	- (0)	
160 (3)	4,3 (3)	7-2-1-0 (3)	76	A	OF	422	3,0 (3)	GERALTON/ 3W
					TF	41	- (0)	
					cS	57	- (0)	
					M	63	- (0)	
100 (4)	4,0 (3)	7-2-1-0 (3)	61	A	OF	97	3,0 (4)	GERALTON/ 3W
					TF	58	- (0)	
					cS	53	- (0)	
121 (4)	4,0 (4)	6,5-3-0,5-0 (4)	46	A	TB	21	- (0)	GERALTON/ 3W
					TPF	22	- (0)	
					OF	207	- (0)	
					TF	189	2,6 (3)	
					M	11	- (0)	
295 (2)	4,3 (2)	9-1-0-0 (2)	9	A	OF	6	- (0)	GERALTON/ 3W
					TF	34	3,5 (2)	
					M	31	- (0)	
193 (4)	4,2 (4)	8-1-1-0(4)	57	A	OF	78	- (0)	GERALTON/ 3W
					TF	26	3,7 (4)	
					cS	21	- (0)	
					tS	33	- (0)	
193 (3)	4,2 (3)	8,5-0,5-1-0 (3)	0	A	TF	55	3,5 (3)	GERALTON/ 3W
					cS	70	- (0)	
					tS	10	- (0)	
					M	11	- (0)	
143 (3)	4,2 (3)	9-0-1-0 (3)	28	A	OF	31	2,8 (1)	GERALTON/ 3W
					TF	78	2,2 (2)	
					cS	23	- (0)	
					M	1	- (0)	
240 (4)	4,1 (4)	6-4-0-0 (4)	16	A	OF	21	3,7 (3)	GERALTON/ 3W
					TF	95	3,2 (1)	
					cS	53	- (0)	
					tS	1	- (0)	
					M	12	- (0)	
63 (3)	4,4 (3)	8-2-0-0 (3)	74	A	OB	52	1,1 (1)	GERALTON/ 3W
					OPF	51	1 (2)	
					TPF	5	- (0)	
					cS	16	- (0)	
					M	15	- (0)	

APPENDIX A.6
II) RECONNAISSANCE SURVEY SITES (CONTINUED).

AREA: LONGLAC - NAKINA

RECONNAISSANCE STUDY SITE (U.T.M. Grid Reference)	TOTAL PEATLAND AREA (ha) X	ESTIMATED AVERAGE DEPTH (cm) (no. of cores) =	ESTIMATED TOTAL VOLUME ($\times 10^6$ M^3) (in situ)	ESTIMATED VOLUME H4+ ($\times 10^6$ M^3) (in situ)	UNHUMIFIED PEAT (H1-H3) * AVERAGE THICKNESS H1-H3 PEAT (cm) (no. of cores)	AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) (% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)
42L-79 (16 485 5567)	494	275 (4)	13.6	4.6	183 (4)	3.0 (4)	7-2-1-0 (4)
42L-169 (16 509 5564)	409	212 (3)	8.7	5.2	83 (3)	3.0 (3)	7-3-0-0 (3)
42L-185 (16 536 5558)	423	303 (3)	12.8	3.5	220 (3)	3.0 (3)	7-3-0-0 (3)
42L-219 (16 457 5542)	486	340 (4)	16.5	11.1	110 (4)	3.0 (4)	6.5-2.5-1-0 (4)
TOTAL	4,469		121.8	62.0			

* In averaging these values all H1-H3 intervals were included, whether or not they were in a surfical position.

HUMIFIED PEAT (H4 +)					PEATLAND CLASSIFICATION			
AVERAGE THICKNESS H4+ PEAT PEAT (cm) (no. of cores)	AVERAGE HUMIFICATION (von Post scale) (no. of cores)	WEIGHTED AVERAGE PEAT TYPE (S-C-L-OTHER) (% MOSS /10 - % SEDGE/10 - % WOOD/10 - % OTHER/10) (no. of cores)	PERCENTAGE OF PEATLAND AREA WITH <10% TREE COVER	BASAL OOZE PRESENT (P) OR ABSENT (A)	PEATLAND TYPE	AREA (ha)	AVERAGE DEPTH OF PEAT (m) (no. of cores)	M.N.R ADMINISTRATIVE DISTRICT/ SITE REGION
93 (4)	4.0 (4)	8-2-0-0 (4)	46	P	OB	103	2.8 (1)	GERALTON/ 3W
					TB	8	- (0)	
					OPF	93	2.9 (3)	
					TPF	190	- (0)	
					cS	78	- (0)	
					tS	18	- (0)	
					hcS	2	- (0)	
					M	2	- (0)	
128 (3)	4.1 (3)	8-1-1-0 (3)	37	A	OB	69	- (0)	GERALTON/ 3W
					TB	91	2.1 (2)	
					OPF	53	- (0)	
					TPF	5	2.2 (1)	
					OF	10	- (0)	
					TF	20	- (0)	
					cS	90	- (0)	
					M	71	- (0)	
83 (3)	4.0 (3)	7-2-1-0 (3)	83	A	OB	59	3.1 (2)	GERALTON/ 3W
					OPF	167	3.0 (1)	
					TPF	10	- (0)	
					OF	82	- (0)	
					TF	47	- (0)	
					cS	50	- (0)	
					M	8	- (0)	
230 (4)	4.2 (4)	8-2-0-0 (4)	68	A	OPF	5	- (0)	NIPIGON/ 3W
					OF	289	3.4 (4)	
					TF	92	- (0)	
					hS	47	- (0)	
					cS	53	- (0)	

Appendix B. Physical and Chemical Properties of Peat Samples from Northwestern Ontario

1. Rainy River
2. Dryden–Lac Seul
3. Sioux Lookout
4. Ignace
5. Armstrong
6. Longlac–Nakina

(*See* Section 3.5 for sources and context of data, and Open File Reports for exact locations of sampling points.)

APPENDIX B.1 PHYSICAL AND CHEMICAL CHARACTERISTICS OF PEAT SAMPLES FROM RAINY RIVER AREA. (Refer to Section 3.5 for sources and context of data.)

NTS	PEAT LAND NO.	SAMPLE POINT LOCATION	CAT EX CAP	H2O PH	CACL2 PH	COND	FIB %	MC % WET	DRY BULK DENS	WET BULK DENS	VAL ABSO	CAP ABSO	ASH %	VOL %	NET CAL /G	C TTL %	C ORG %	C:N	N %	H %	S %	O %	AS PPM
52C	37	B1500E	129	4.0	3.2	18	97	94	.06	1.00	14.7	32.3	3.9	79.3	4100	44.9	40.3	37.4	1.2	4.5	.13	45.4	.4
52C	37	B1500E	147	3.7	3.1		48	94	.08	1.23	14.3	27.0	5.5	74.4	4162	51.2	50.0	39.4	1.3	5.9	.14	36.0	3.0
52C	37	B1500E	146	4.3	3.4	42	60	93	.06	1.00	14.0	27.8	3.4	75.1	4571	52.8	51.9	37.7	1.4	5.6	.07	36.7	<.1
52C	37	B1500E	124	5.0	4.3	65	53	93	.06	.96	13.0	24.4	3.3	71.4	4862	50.4	49.3	29.6	1.7	4.8	.14	39.7	<.1
52C	37	B1500E	136	5.8	5.1	70	52	90	.10	1.07	8.9	10.9	6.4	66.3	4600	48.7	44.8	28.6	1.7	4.4	.25	38.5	<.1
52C	37	B1500E	136	5.9	5.2	83	54	89	.11	1.02	7.9	8.6	6.6	66.6	4483	51.4	50.7	30.2	1.7	5.9	.24	34.2	<.1
52C	37	B1500E	143	6.3	5.6	86	43	87	.13	1.02	6.8	9.2	8.6	63.9	4459	48.7	45.3	21.2	2.3	4.7	.40	35.3	.4
52C	37	B1500E	129	6.4	5.8	91	45	88	.11	1.01	7.6	11.7	8.3	64.9	4466	61.8	60.0	26.9	2.3	6.2	.48	20.9	.5
52C	37	B1000E	143	4.0	3.1	20	98	95	.08	1.15	17.5	33.2	5.7	73.8	4143	40.2	31.1	26.8	1.5	4.1	.19	48.3	1.4
52C	37	B1000E	126	4.2	3.5	35	60	93	.07	1.10	13.4	18.9	4.6	72.8	4622	49.3	46.8	35.2	1.4	5.1	.09	39.5	.4
52C	37	B1000E	123	4.9	4.3	54	83	93	.07	1.04	13.9	22.8	4.1	70.7	4682	49.0	45.3	32.7	1.5	5.1	.09	40.2	<.1
52C	37	B1000E	131	5.3	4.5	59	59	93	.07	.97	12.5	12.2	3.8	70.4	4633	52.3	51.9	34.9	1.5	5.3	.15	36.9	<.1
52C	37	B1000E	157	5.7	5.0	65	66	90	.10	1.07	8.9	12.7	4.8	66.7	4550	50.4	49.6	28.0	1.8	5.0	.47	37.5	<.1
52C	37	B1000E	119	6.0	5.4	77	56	89	.12	1.08	8.0	8.5	5.8	66.8	4575	50.8	49.8	28.2	1.8	5.2	.70	35.7	.1
52C	37	B1000E	137	6.1	5.5	98	55	87	.13	1.00	6.6	13.0	7.0	64.8	4531	49.3	43.5	21.4	2.3	4.7	.69	36.0	.4
52C	37	B1000E	115	6.4	5.7	105	43	86	.14	1.00	6.1	11.4	14.2	60.8	4207	46.3	40.0	21.0	2.2	4.9	.75	31.6	1.0
52C	37	B5700E	83	4.4	3.4	27	57	88	.12	1.07	7.5	16.6	10.0	68.9	4104	46.4	40.6	42.2	1.1	4.8	.11	37.6	.6
52C	37	B5700E	163	4.0	3.4	49	49	88	.13	1.16	7.4	16.1	5.4	72.1	4654	50.4	49.5	31.5	1.6	5.8	.13	36.7	<.1
52C	37	B5700E	124	5.0	4.4	31	46	90	.10	1.01	8.5	15.7	5.7	69.0	4885	54.4	54.0	23.7	2.3	5.9	.11	31.6	.4
52C	37	B5700E	125	5.7	5.0	36	28	88	.13	1.08	7.3	12.1	7.5	64.3	4704	49.6	42.1	23.6	2.1	4.7	.13	36.0	.6
52C	37	B5700E	107	5.9	5.1	52	38	84	.16	1.04	5.3	13.9	7.1	56.3	4043	43.5	38.2	20.7	2.1	4.5	.16	42.6	.7
52C	31	F800E	154	4.4	3.4	35	90	92	.08	1.01	11.4	43.4	2.8	78.3	4293	50.2	49.6	45.6	1.1	5.6	.10	40.2	.8
52C	31	F800E	114	4.0	3.3	13	73	91	.09	1.05	9.7	17.4	10.1	70.7	4099	47.5	42.9	33.9	1.4	4.6	.13	36.3	.4
52C	31	F800E	201	4.4	4.0	46	42	91	.08	1.03	10.7	23.5	4.9	70.5	4852	54.4	53.6	30.2	1.8	6.0	.11	32.8	.1
52C	31	F800E	151	6.1	5.8	78	53	88	.12	1.01	7.5	14.6	7.0	65.0	4632	51.4	49.8	27.1	1.9	5.1	.38	34.2	.1
52C	31	F800E	221	4.4	3.8	47	47	91	.08	.99	10.6	23.7	5.7	69.5	4779	53.4	52.8	28.1	1.9	5.9	.13	33.0	<.1
52C	31	F800E	144	6.4	5.9	111	42	88	.12	1.08	7.4	13.0	11.7	63.6	4524	51.2	50.3	20.5	2.5	5.5	.88	28.2	.3
52C	31	L1500W+300S	226	4.4	3.6	19		94	.05	1.02	16.7	34.7	4.1	77.5	4177	47.5	45.4	43.2	1.1	4.6	.09	42.6	.4
52C	31	L1500W+ 300S	158	4.3	3.9	28		91	.09	1.08	10.6	15.9	3.9	70.4	4500	51.0	50.0	42.5	1.2	5.6	.13	38.2	.2
52C	31	L1500W+ 300S	117	5.9	5.7	52	55	87	.14	1.06	6.5	8.8	7.5	65.0	4428	52.8	51.9	27.8	1.9	5.7	.66	31.4	.3
52C	23	B1600N	171	3.7	3.5	64	89	92	.08	1.08	11.6	24.8	4.4	79.6	4129	49.6	47.2			5.3	.11		<.2
52C	23	B1600N	121	3.9	3.5		61	92	.08	1.06	12.1	22.4	9.0		4019	45.9	41.9			5.3	.12		1.4
52C	23	B1600N	86	4.5	4.3	39	34	90	.10	1.03	8.7	15.1	6.7	69.3	5009	54.4	54.1	36.3	1.5	5.3	.10	32.0	.1
52C	23	B1600N	127	6.0	6.0	65	46	90	.11	1.01	8.7	11.3	9.5	63.8	4531	49.6	47.8	23.6	2.1	5.3	.19	33.4	.1
52C	23	B1600N	127	5.8	5.7	100	44	90	.10	1.04	9.2	13.4	11.8	66.5	4533	50.2	50.0	26.4	1.9	5.3	.48	30.4	1.1
52C	23	B200N	117	4.3	3.6	31	75	88	.15	1.33	7.4	16.8	6.8	73.4	4260	48.5	46.2	18.7	2.6	5.2	.10	36.8	<.1
52C	23	B200N	139	4.2	4.0	41	47	93	.07	1.00	12.0	21.0	4.4	73.2	4662	50.7	49.0	31.4	1.7	5.1	.10	38.1	.2
52C	23	B200N	174	5.1	5.2	79	50	91	.09	1.04	9.8	15.8	7.2	64.1	4769	55.2	55.0	34.5	1.6	6.0	.08	29.9	.1
52C	23	B200N	148	5.5	5.6	72	52	91	.09	1.02	9.6	13.4	8.4	66.1	4757	52.7	52.6			5.0	.14		.1
52C	23	B200N	157	5.8	5.8	76	50	89	.11	1.03	7.7	10.3	10.9	63.7	4561	49.8	47.7	23.7	2.1	5.1	.26	31.8	2.0
52C	23	B200N	119	5.9	5.9	88	52	89	.10	.99	8.3	10.6	11.6	65.1	4485	51.1	50.8	21.3	2.4	5.5	.41	29.0	6.5
52C	23	B200N	123	5.9	6.0	233	16	89	.11	.99	7.7	12.3	15.9	64.3	4228	46.7	41.3	18.0	2.6	5.0	1.3	28.5	.2
52C	32	L2500S+ 300W	146	4.3	3.7	14	100	94	.06	1.13	15.4	33.4	6.1	78.9	4307	49.0	47.0	40.8	1.2	5.0	.09	38.6	.2
52C	32	L2500S+ 300W	158	3.9	3.4	5	52	95	.05	1.00	17.4	23.9	6.5	75.4	4712	50.5	48.8	36.1	1.4	5.4	.08	36.1	.5
52C	32	L2500S+ 300W	120	5.4	4.8	61	58	95	.04	1.01	19.9	25.4	6.7	70.8	4714	54.2	53.8			5.8	.21	33.1	<.1
52C	32	L2500S+ 300W	103	5.5	5.1	59	58	95	.05	.99	18.1	21.1	6.8	73.7	4770	53.8	52.6	24.5	2.2	5.0	.16	32.1	<.1
52C	32	L2500S+ 300W	98	5.9	5.7	101	36	93	.07	1.05	12.3	12.9	21.0	62.8	3868	41.8	39.9			5.1	.67		<.1
52C	32	B3500S	165	4.1	3.5	8	100	93	.08	1.10	12.7	22.5	3.5	80.7	4280	47.8	45.4	47.8	1.0	4.5	.10	43.1	.6
52C	32	B3500S	114	3.9	3.1	10	46	93	.07	1.04	13.1	16.8	3.8	74.5	4688	52.1	51.0	37.2	1.4	5.2	.08	37.4	<.1
52C	32	B3500S	112	4.3	3.5	36	51	93	.06	.99	13.8	20.1	4.4	72.4	4742	53.3	51.9	41.0	1.3	5.3	.08	35.6	<.1
52C	32	B3500S	90	5.6	4.9	69	48	91	.09	.99	9.5	13.6	6.9	64.0	4519	54.0	53.7	36.0	1.5	5.4	.28	31.9	.2
52C	32	B3500S	53	6.0	5.2	77	24	80	.19	1.00	4.1	8.2	8.7	63.3	4433	52.3	52.0	24.9	2.1	5.2	.13	31.6	.2
52C	32	B3500S	78	6.1	5.4	119	19	83	.19	1.09	4.7	9.5	20.1	57.4	3966	46.4	44.8	19.3	2.4	4.2	.46	26.4	.5
52C	44	F500N	224	4.4	3.1	34	85	93	.07	1.00	12.4	17.8	4.4	78.8	4267	49.3	48.1	37.9	1.3	4.7	.08	40.2	<.1
52C	44	F500N	294	4.0	3.2	14	64	94	.05	.99	16.7	23.0	5.2	74.2	4507	50.6	49.4	31.6	1.6	5.0	.10	37.5	<.1
52C	44	F500N	159	6.0	5.0	59	64	92	.07	1.01	12.1	17.2	5.0	69.0	4717	52.6	52.1	29.2	1.8	5.6	.14	34.9	<.1
52C	44	F500N	147	6.2	5.4	66	60	90	.11	1.07	8.7	10.9	5.8	66.5	4518	50.8	50.4	25.4	2.0	5.2	.20	36.0	<.1
52C	44	F500N	137	6.3	5.6	72	45	89	.10	.99	8.4	10.9	9.3	65.1	4461	52.4	51.9	21.8	2.4	5.3	.37	30.2	.6
52C	44	F2500N+ 400W	132	4.3	3.2	38	85	90	.10	.99	8.5	28.7	3.7	80.0	4285	48.1	45.3	40.1	1.2	4.2	.10	42.7	<.1
52C	44	F2500N+ 400W	109	4.4	3.6	47	43	91	.09	1.06	10.2	14.6	4.2	75.8	4625	52.8	51.7	40.6	1.3	5.2	.12	36.4	<.1
52C	44	F2500N+ 400W	105	5.6	4.8	61	48	90	.10	1.05	9.3	11.5	5.3	68.2	4748	56.4	55.3	37.6	1.5	5.8	.15	30.8	<.1
52C	44	F2500N+ 400W	139	6.4	5.6	63	40	88	.11	.99	7.4	8.0	9.4	65.3	4303	50.3	48.9	26.5	1.9	5.0	.10	33.3	<.1
52C	44	F2500N+ 400W	82	6.5	6.3	142	39	86	.14	1.08	6.4	10.8	17.7	81.8	4198	47.5	45.2			5.3	.47		2.1
52C	44	B900S	241	4.5	3.6	18	99	95	.05	1.10	18.1	37.0	3.8	77.2	4296	48.6	45.6	34.7	1.4	4.1	.11	42.0	.6
52C	44	B900S	112	6.1	5.5	49	39	88	.11	1.00	7.5	7.8	8.5	70.4	4537	51.8	50.5	28.8	1.8	5.1	.19	32.6	<.1
52C	44	B900S	124	6.3	5.8	56	43	89	.11	1.05	8.1	10.2	7.7	59.1	4539	50.4	50.0	21.9	2.3	5.0	.32	34.3	<.1
52C	44	B900S	106	6.6	6.1	63	31	89	.10	.99	8.2	11.1	7.5	70.8	4695	52.1	51.1	18.6	2.8	6.0	.55	31.0	.6
52C	44	B4900S	236	4.2	3.3	8	92	95	.05	1.02	17.7	29.9	4.1	79.1	4293	48.4	43.3	34.6	1.4	4.3	.15	41.6	.2
52C	44	B4900S	230	3.5	3.2		61	94	.06	1.04	15.0	28.7	3.9	78.1	4534	48.7	42.9	34.8	1.4	4.1	.05	41.8	<.1
52C	44	B4900S	255	4.1	3.5	27	50	94	.05	.99	15.7	21.8	3.4	76.4	4620	51.5	49.7	57.2	.9	4.9	.14	39.2	<.1
52C	44	B4900S	156	5.8	5.2	67	48	92	.08	1.03	11.2	13.5	6.0	68.5	4700	51.6	50.5	27.2	1.9	5.0	.14	35.4	<.1
52C	44	B4900S	176	6.4	5.9	76	45	92	.08	1.03	11.4	12.8	8.0	67.6	4567	52.3	52.0	20.1	2.6	5.0	.18	31.9	.6
52C	44	B6000S	139	3.8	3.1		78	93	.07	1.05	13.6	26.1	6.8	76.7	4110	47.6	45.1	52.9	.9	4.2	.09	40.4	.6
52C	44	B6000S	184	3.7	3.1		61	93	.08	1.08	12.5	24.3	3.4	76.3	4327	49.1	46.2	49.1	1.0	4.7	.08	41.7	<.1
52C	44	B6000S	165	4.9	4.4	50	52	92	.08	1.01	11.1	19.0	5.4	68.2	4694	51.6	50.4	28.7	1.8	4.9	.09	36.2	.2
52C	44	B6000S	191	5.5	5.2	59	45	92	.08	1.02	10.8	25.3	6.0	69.5	4707	53.6	53.4	26.8	2.0	5.8	.11	32.5	<.1
52C	44	B6000S	150	5.8	5.5	60	54	91	.09	1.05	10.7	10.7	7.0	64.1	4376	51.5	50.8	33.3	1.7	5.4	.15	34.2	.3
52C	44	B6000S	144	6.0	5.7	70	47	88	.11	1.01	7.6	7.9	9.6	62.0	4264	50.2	50.0	26.4	1.9	4.8	.36	33.1	2.7

HG PPM	CA PPM	P PPM	K PPM	AL PPM	FE PPM	PB PPM	MN PPM	MG PPM	CU PMM	ZN PMM	TOP INT (CM)	BOT INT (CM)	HUM 1-9	PEAT TYPE S	C	L	X	REL POS	VEGETATION COVER T %	TS %	LS %	G %	SP %	FOR	SUB	SUR WAT PH	AV D-W CM
.10	2144	676	1475	2535	2886	21	67	1085	5	35	0	10	1	8	2	0	0	0	12	0	55	40	85	1	4	4.5	26
.06	2433	563	1202	3478	2056	18	43	944	4	30	10	40	3	8	2	0	0	1	12	0	55	40	85	1	4	4.5	26
.04	3062	489	596	2236	1050	5	13	1350	3	10	40	150	4	7	3	0	0	1	12	0	55	40	85	1	4	4.5	26
.02	6594	532	476	1995	860	4	10	2314	3	5	150	220	4	7	2	1	0	2	12	0	55	40	85	1	4	4.5	26
.02	16820	352	629	2649	1039	<2	16	3632	3	3	220	330	5	8	0	2	0	2	12	0	55	40	85	1	4	4.5	26
.04	17151	277	528	2001	944	2	20	3632	3	4	330	470	6	9	0	1	0	3	12	0	55	40	85	1	4	4.5	26
.01	20523	326	713	2449	2829	<2	60	4101	4	5	470	540	7	9	1	0	0	4	12	0	55	40	85	1	4	4.5	26
.01	17758	384	837	2813	4168	<2	71	4417	5	12	540	600	6	0	10	0	0	4	12	0	55	40	85	1	4	4.5	26
.03	1985	755	1235	3973	2625	28	34	1112	8	33	0	30	3	10	0	0	0	1	13	0	60	10	95	1	4	4.7	26
.03	2788	433	581	2098	999	7	10	1431	3	9	30	130	4	7	3	0	0	1	13	0	60	10	95	1	4	4.7	26
.04	6499	457	543	2195	893	<2	13	2605	2	5	130	230	5	8	2	0	0	2	13	0	60	10	95	1	4	4.7	26
.04	9099	359	511	2015	875	<2	18	2968	3	13	230	270	4	7	1	1	0	2	13	0	60	10	95	1	4	4.7	26
.04	15049	304	452	1811	997	<2	41	3866	3	9	270	330	4	8	0	2	0	3	13	0	60	10	95	1	4	4.7	26
.05	18403	280	380	1577	1225	<2	60	4068	4	15	330	400	5	8	1	1	0	3	13	0	60	10	95	1	4	4.7	26
.04	19126	335	666	2368	2811	<2	87	4849	6	25	440	470	4	9	0	1	0	4	13	0	60	10	95	1	4	4.7	26
.04	14340	443	2474	7535	5737	<2	100	5578	14	45	470	530	5	10	0	0	0	4	13	0	60	10	95	1	4	4.7	26
.17	3883	714	2758	6148	6104	31	131	1386	10	47								0	0	0	61	25	95	1	3	4.5	28
.04	4412	615	1000	3553	1567	5	14	979	4	10	0	40	3	9	0	1	0	1	0	0	61	25	95	1	3	4.5	28
.02	8890	526	992	3749	2972	4	15	1267	4	7	40	140	5	9	0	1	0	2	0	0	61	25	95	1	3	4.5	28
.04	18663	312	866	3157	8230	<2	30	2179	4	5	140	200	5	8	0	2	0	3	0	0	61	25	95	1	3	4.5	28
.02	19864	403	3026	8907	10642	2	69	2955	8	10	200	240	7	9	0	1	0	4	0	0	61	25	95	1	3	4.5	28
.14	4438	501	2666	1329	1001	9	405	1311	8	33	0	10	1	10	0	0	0	0	0	0	73	15	90	1	6	4.7	47
.10	3344	859	2286	4506	2805	23	37	1561	5	43	10	30	3	10	0	0	0	1	0	0	73	15	90	1	6	4.7	47
.03	4198	579	688	2534	1035	10	8	2018	4	6	30	100	5	9	1	0	0	1	0	0	73	15	90	1	6	4.7	47
.06	12194	267	1172	2973	1810	11	68	4004	3	12	100	300	5	9	0	1	0	2	0	0	73	15	90	1	6	4.7	47
.04	3975	610	773	3153	1107	10	8	1967	3	5	300	360	5	10	0	0	0	4	0	0	73	15	90	1	6	4.7	47
.12	16831	519	1634	4925	4882	5	85	3978	6	18	360	430	5	7	3	0	0	4	0	0	73	15	90	1	6	4.7	47
.17	4833	587	2874	1575	2029	19	103	2622	3	44	0	10	1	10	0	0	0	0	30	0	72	8	93	1	4	4.7	31
.04	7627	337	496	1915	1039	7	33	2275	2	10	10	150	3	10	0	0	0	2	30	0	72	8	93	1	4	4.7	31
.07	26433	258	383	2237	2854	<2	136	4128	4	21	150	270	5	10	0	0	0	4	30	0	72	8	93	1	4	4.7	31
.07	3925	562	1870	1755	2593	14	60	1240	3	31	0	5	1	10	0	0	0	0	1	2	80	34	97	1	4	4.8	37
.08	3237	833	1916	4661	2880	20	27	1316	4	37	5	20	3	10	0	0	0	1	1	2	80	34	97	1	4	4.8	37
.02	6879	472	779	3443	964	7	8	1244	4	4	20	120	5	9	1	0	0	1	1	2	80	34	97	1	4	4.8	37
.05	20701	323	909	2946	2714	6	57	3591	6	8	120	320	4	9	1	0	0	2	1	2	80	34	97	1	4	4.8	37
.06	15153	536	1452	5402	4520	5	27	2262	8	19	320	360	4	9	0	1	0	4	1	2	80	34	97	1	4	4.8	37
.15	4299	727	2399	2887	2525	27	329	1266	7	55	0	10	1	9	0	1	0	0	14	0	68	16	90	1	5	4.7	37
.04	4489	377	543	2040	989	4	13	1186	3	43	10	240	5	9	0	1	0	1	14	0	68	16	90	1	5	4.7	37
.05	10327	441	658	2777	990	4	9	1960	3	9	240	330	6	10	0	0	0	2	14	0	68	16	90	1	5	4.7	37
.03	17864	298	613	2571	1691	<2	14	2921	3	9	330	400	3	7	1	2	0	3	14	0	68	16	90	1	5	4.7	37
.03	24733	315	934	3239	3056	3	28	3421	8	7	400	500	5	10	0	0	0	4	14	0	68	16	90	1	5	4.7	37
.04	21106	402	1279	3761	3724	6	32	3242	8	10	500	530	6	10	0	0	0	4	14	0	68	16	90	1	5	4.7	37
.04	21741	455	1978	6096	10404	5	45	3529	13	55	530	570	5	9	1	0	0	4	14	0	68	16	90	1	5	4.7	37
.12	3279	571	2425	1674	1848	17	147	1146	5	61	0	10	1	9	0	1	0	0	5	0	71	13	95	1	5	4.7	35
.04	1354	447	761	2140	1318	12	14	546	6	14	10	250	3	9	0	1	0	1	5	0	71	13	95	1	5	4.7	35
.04	10204	301	414	1575	1034	<2	25	2465	6	17	250	400	3	8	1	1	0	3	5	0	71	13	95	1	5	4.7	35
.06	10820	351	430	1685	1203	7	31	2241	6	13	400	500	3	8	2	0	0	3	5	0	71	13	95	1	5	4.7	35
.12	12379	428	3703	9594	6320	7	60	3222	10	45	500	600	3	9	0	1	0	4	5	0	71	13	95	1	5	4.7	35
.08	1712	542	2147	1667	1752	18	34	897	5	44	0	10	1	9	1	0	0	0	14	0	45	19	85	1	6	4.8	40
.01	1733	466	564	2157	887	5	7	595	4	8	0	120	3	9	1	0	0	1	14	0	45	19	85	1	6	4.8	40
.03	3724	386	727	2389	1040	11	7	1166	6	7	120	240	4	8	2	0	0	2	14	0	45	19	85	1	6	4.8	40
.04	21852	248	491	2187	1589	5	15	3092	8	52	240	380	4	8	1	1	0	3	14	0	45	19	85	1	6	4.8	40
.04	26490	292	904	2993	3491	6	35	3291	5	2	380	450	4	9	1	0	0	3	14	0	45	19	85	1	6	4.8	40
.04	22842	550	3575	10843	8627	9	74	4150	16	36	450	560	4	8	2	0	0	4	14	0	45	19	85	1	6	4.8	40
.06	3187	600	2678	2087	2380	23	189	1194	5	65	0	10	1	9	0	1	0	0	14	0	50	15	95	1	4	4.7	20
.04	1603	540	915	2857	1146	18	17	518	5	20	10	200	3	9	0	1	0	1	14	0	50	15	95	1	4	4.7	20
.04	6641	193	348	1368	637	15	9	1916	<1	1	200	440	4	7	1	2	0	3	14	0	50	15	95	1	4	4.7	20
.03	22702	261	83	1433	3202	6	53	3979	<1	4	440	540	4	9	0	1	0	4	14	0	50	15	95	1	4	4.7	20
.03	12887	292	660	2575	3984	9	40	2650	2	10	540	600	4	6	3	1	0	4	14	0	50	15	95	1	4	4.7	20
.08	3530	491	1860	1747	1609	21	407	948	4	28	0	10	1	9	1	0	0	0	5	0	45	6	95	1	4	4.7	30
.05	4144	430	386	2451	914	9	14	1461	2	11	10	130	4	9	1	0	0	1	5	0	45	6	95	1	4	4.7	30
.05	12457	305	454	2458	922	4	7	2952	3	3	130	230	5	9	0	1	0	2	5	0	45	6	95	1	4	4.7	30
.04	21005	238	885	3320	2459	3	23	4111	3	2	230	420	5	10	0	0	0	3	5	0	45	6	95	1	4	4.7	30
.06	16713	388	3229	9674	6700	6	47	4401	8	23	420	440	6	0	10	0	0	4	5	0	45	6	95	1	4	4.7	30
.06	5727	791	4530	1929	1501	10	765	1683	3	43	0	10	1	9	0	1	0	0	29	0	44	11	93	4	4	4.9	27
.06	14716	407	1020	3786	1727	4	59	4614	2	10	10	100	4	9	0	1	0	1	29	0	44	11	93	4	4	4.9	27
.04	14624	320	646	2426	2807	<2	80	3787	2	2	100	320	4	8	1	1	0	2	29	0	44	11	93	4	4	4.9	27
.05	16858	401	666	2542	4382	<2	69	3447	3	6	320	420	5	6	4	0	0	4	29	0	44	11	93	4	4	4.9	27
.06	4332	532	2038	1839	3153	42	244	1503	4	67	0	10	1	9	1	0	0	0	4	0	35	25	95	1		4.7	14
.04	2061	420	499	1881	1232	9	17	682	2	16	10	60	3	8	2	0	0	1	4	0	35	25	95	1		4.7	14
.04	2236	364	316	1753	947	19	6	987	3	10	60	230	3	6	3	1	0	1	4	0	35	25	95	1		4.7	14
.02	9249	366	787	2873	1619	8	8	3147	4	11	230	490	3	6	3	1	0	3	4	0	35	25	95	1		4.7	14
.03	12713	320	1148	2993	2216	5	13	3099	3	12	490	600		6	4	0	0	4	4	0	35	25	95	1		4.7	14
.06	1444	464	1436	4047	2731	21	27	978	5	30	0	20	2	10	0	0	0	1	28	0	35	10	95	1	4	4.2	22
.05	1263	300	542	1983	756	14	7	513	2	10	20	260	3	10	0	0	0	1	28	0	35	10	95	1	4	4.2	22
.02	8248	476	590	2806	1583	30	10	1523	5	12	260	400	3	8	2	0	0	3	28	0	35	10	95	1	4	4.2	22
.03	12648	459	617	3001	2166	<2	22	2061	2	14	400	440	4	5	4	1	0	3	28	0	35	10	95	1	4	4.2	22
.04	21913	245	251	2002	3751	73	47	2990	4	7	440	560	4	7	2	1	0	4	28	0	35	10	95	1	4	4.2	22
.10	20920	280	716	3364	5609	<2	62	3583	5	13	560	610	4	8	2	0	0	4	28	0	35	10	95	1	4	4.2	22

APPENDIX B.1 RAINY RIVER AREA (CONTINUED).

NTS	PEAT LAND NO.	SAMPLE POINT LOCATION	CAT EX CAP	H2O PH	CACL2 PH	COND	FIB %	MC % WET	DRY BULK DENS	WET BULK DENS	VAL ABSO	CAP ABSO	ASH %	VOL %	NET CAL /G	C TTL %	C ORG %	C:N	N %	H %	S %	O %	AS PPM
52D	16	B700N	85	6.5	6.1	169	37	77	.32	1.37	3.3	6.6	19.1	60.7	3708	41.0	40.0	6.5	6.3	4.3	.20	29.1	7.2
52D	16	B700N	103	6.1	5.6	97	26	84	.17	1.09	5.2	8.2	7.5	64.9	4533	50.4	49.0	19.4	2.6	5.2	.14	34.2	2.5
52D	16	B700N	138	5.9	5.4	56	44	88	.13	1.09	7.2	8.1	8.5	65.5	4595	50.6	49.4	18.7	2.7	4.8	.25	33.1	.9
52D	16	B1500N	70	6.6	5.9	170	34	80	.26	1.30	4.0	6.5	20.4	60.2	3751	42.9	37.1	15.9	2.7	4.5	.22	29.3	3.5
52D	16	B1500N	127	5.9	5.5	65	38	86	.15	1.05	6.0	11.5	8.6	75.7	4525	51.4	50.9	21.4	2.4	5.4	.29	31.9	.6
52D	16	B1500N	103	5.9	5.6	77	36	86	.14	1.08	6.1	9.6	8.8	67.3	4682	52.6	51.8	20.2	2.6	5.6	.71	29.7	3.7
52D	26	L500E+ 800S	94	6.8	6.6	152	80	88	.12	1.09	7.6	15.5	10.7	70.1	4086	46.3	40.0	23.2	2.0	4.6	.18	36.2	1.6
52D	26	L500E+ 800S	151	6.0	5.5	42	54	87	.14	1.11	6.6	11.2	8.7	66.2	4448	49.5	48.3	21.5	2.3	4.6	.21	34.7	.3
52D	26	L500E+ 800S	141	6.3	5.7	59	42	86	.15	1.05	6.0	10.1	10.5	64.0	4364	50.6	49.6	29.8	1.7	5.5	.30	31.4	.2
52D	26	L500E+ 800S	146	6.4	5.7	53	33	86	.14	1.04	6.0	13.9	11.3	64.6	4460	50.2	49.2	20.1	2.5	5.3	.67	30.0	1.0
52D	26	L500E+ 800S	6		3.8		38	86			6.3		49.8	34.1	2312	27.9	14.4	14.7	1.9	3.9	.77	15.7	3.0
52D	26	B4200E	60	4.7	6.5	58	52	78	.22	.99	3.5	7.3	6.4	74.0	4265	47.1	42.3	36.2	1.3	5.2	.11	39.9	.4
52D	26	B4200E	146	6.2	5.9	84	57	86	.14	1.03	6.5	7.9	10.5	63.2	4123	46.0	43.5	22.5	2.1	4.4	.30	36.9	.2
52D	26	B4200E	169	6.3	5.7	83	45	86	.14	1.04	6.1	8.6	9.2	64.4	4312	49.6	45.8	23.6	2.1	5.0	.63	33.5	.3
52D	26	B4200E	170	6.3	5.7	64	46	86	.14	1.02	5.9	11.5	12.3	62.7	4199	49.5	45.5	26.1	1.9	5.2	.64	30.5	.7
52D	26	B2400E	72	6.5	6.0	120	91	86	.14	1.05	6.3	14.9	10.8	69.7	4249	47.8	44.3	26.6	1.8	4.8	.13	34.7	3.6
52D	26	B2400E	108	6.5	5.9	59	51	91	.09	1.05	10.6	12.2	4.8	71.6	4565	48.7	45.7	19.7	2.5	5.1	.15	38.8	.2
52D	26	B2400E	129	6.8	6.2	66	54	92	.08	1.05	10.7	12.4	8.2	71.4	4563	50.0	49.3	20.8	2.4	5.5	.34	33.6	.1
52D	26	B2400E	119	6.9	6.3	68	44	92	.08	1.00	11.4	14.8	7.6	69.3	4691	51.0	49.8	17.6	2.9	5.6	.79	32.1	.8
52D	26	B2400E	112	6.8	6.3	133	42	90	.10	1.02	8.8	12.3	12.0	66.7	4479	50.3	49.8	18.0	2.8	5.2	1.2	28.5	8.8
52D	29	B500W	111	4.0	3.3	22	91	84	.19	1.23	5.4	21.4	6.7	76.3	4298	47.2	41.8	42.9	1.1	4.9	.10	40.0	1.4
52D	29	B500W	168	4.2	3.2	51	83	93	.10	1.39	12.8	28.2	7.4	74.7		47.0	46.2			5.0	.12		.9
52D	29	B500W	184	4.1	3.5	28	50	90	.10	1.00	8.7	13.6	5.8	71.4	5547	53.4	52.4	38.1	1.4	5.9	.10	33.4	<.1
52D	29	B500W	146	5.5	4.9	51	53	91	.09	1.09	10.4	18.0	5.1	71.1	4752	51.5	50.5	30.3	1.7	5.0	.17	36.5	<.1
52D	29	B500W	108	6.3	5.7	55	46	89	.10	1.02	8.3	14.3	7.0	70.9	4788	51.7	50.3	19.1	2.7	4.8	.06	33.2	4.2
52D	29	B2200W	140	4.7	4.1	90	95	91	.09	1.05	10.4	20.0	5.6	75.8	4236	47.2	43.9	36.3	1.3	4.6	.13	41.2	.3
52D	29	B2200W	141	6.0	5.3	44	61	92	.08	1.02	11.2	22.4	5.2	66.7		54.3	54.1	24.7	2.2	5.7	.11	32.5	<.1
52D	29	B2200W	136	6.3	5.7	48	56	92	.08	1.06	11.5	17.1	5.7	70.3		51.5	50.6	20.6	2.5	5.4	.30	34.6	<.1
52D	29	B2200W	135	6.7	6.0	57	69	93	.08	1.16	13.3	22.1	6.1	69.7		50.8	49.0	22.1	2.3	4.7	.40	35.7	.1
52D	29	B2200W	143	6.6	6.2	64	53	92	.08	1.03	11.5	19.4	6.7	69.1	4626	51.2	50.8	10.4	4.9	5.8	.64	30.8	.1
52D	29	B2200W	109	6.8	6.2	73	49	91	.09	1.03	10.1	14.3	8.1	65.3		52.4	51.8	20.2	2.6	5.9	.95	30.1	.6
52D	29	B3100W	142	4.4	3.3	48	96	89	.11	.99	8.0	30.7	3.9	76.2	4377	49.0	46.8	40.8	1.2	5.1	.09	40.7	<.1
52D	29	B3100W	120	3.9	3.0	24	81	93	.07	1.13	13.9	28.3	10.0	72.8		46.9	40.2	33.5	1.4	4.7	.17	36.8	<.1
52D	29	B3100W	112	4.6	3.8	30	63	92	.08	1.01	11.2	17.3	4.2	75.0		53.6	52.9	17.3	3.1	6.1	.20	32.8	<.1
52D	29	B3100W	126	5.7	5.0	42	72	92	.09	1.13	10.8	18.7	5.7	72.4		47.7	44.2	17.0	2.8	4.7	.32	38.8	<.1
52D	29	B3100W	111	6.3	5.5	80	53	92	.08	1.00	11.0	15.9	8.0	66.8	4753	51.2	50.4	19.0	2.7	5.4	1.0	31.7	.3
52D	29	B3100W	102	6.4	5.6	84	54	91	.09	1.02	9.9	12.9	9.6	65.1		52.0	51.6	18.6	2.8	5.8	1.1	28.6	.8
52D	29	B2300W+ 100N	176	4.4	3.4	83	107	95	.04	1.06	20.6	37.2	4.4	79.2	4111	50.4	49.9	45.8	1.1	5.5	.11	38.5	.3
52D	29	B2300W+100N	146	5.1	4.5	36	73	93	.08	1.00	12.3	17.6	7.1	71.2	4376	47.7	45.1	27.0	1.8	5.1	.14	38.3	.1
52D	29	B2300W+ 100N	163	5.9	5.3	41	62	92	.08	1.02	11.6	17.7	3.6	71.6	4836	53.9	53.0	20.0	2.7	6.0	.23	33.6	.1
52D	29	B2300W+ 100N	195	6.5	6.0	52	72	94	.06	1.01	14.4	19.1	5.6	70.1	4164	51.5	51.1	19.8	2.6	5.8	.65	33.8	<.1
52D	29	B2300W+ 100N	135	6.6	6.1	66	62	92	.08	1.06	11.9	13.5	7.1	66.6	4692	52.8	52.1	20.3	2.6	5.9	.62	31.0	.2
52D	21	H700S	66	6.5	6.0	158	54	87	.14	1.09	6.8	12.1	14.1	68.1	3887	44.6	39.2	24.8	1.8	4.6	.10	34.8	7.6
52D	21	H700S	92	5.9	5.5	41	55	88	.13	1.10	7.4	10.2	8.7	67.4	4405	50.0	49.4	21.7	2.3	4.9	.20	33.9	.6
52D	21	H700S	70	5.9	5.5	44	49	86	.15	1.06	5.9	7.1	12.0	64.2	4231	48.2	42.9	24.1	2.0	4.7	.41	32.7	2.8
52D	21	J1000W	196	4.7	3.9	41	104	93	.07	1.15	13.7	26.2	3.9	79.4	4176	46.9	40.3	42.6	1.1	4.3	.18	43.6	.4
52D	21	J1000W	139	4.9	4.4	38	67	93	.07	1.06	12.4	18.4	4.9	72.9	4542	51.4	50.8	25.7	2.0	5.1	.13	36.5	.2
52D	21	J1000W	106	5.4	5.0	45	60	89	.11	1.03	7.9	11.1	6.8	67.0	4459	52.9	51.9	25.2	2.1	5.6	.25	32.4	.1
52D	21	J1000W	114	6.1	5.7	66	51	88	.12	1.02	7.5	9.6	6.8	32.0	4386	51.3	50.7	24.4	2.1	5.5	.41	33.9	<.1
52D	21	H3100S	116	6.8	6.5	151	81	83	.17	1.00	4.9	15.0	10.7	68.8	4149	46.2	39.7	33.0	1.4	4.8	.20	36.7	.2
52D	21	H3100S	156	7.0	6.9	267	43	88	.12	1.05	7.2	12.0	13.5	63.9	3846	44.9	39.4	32.1	1.4	4.2	.47	35.5	.3
52D	21	H3100S	142	7.3	7.4	500	53	90	.10	1.06	9.5	13.3	16.9	64.3	3690	42.4	35.8	35.3	1.2	4.1	1.4	34.0	.1
52D	21	H3100S	58	7.4	7.6	545	14	76	.26	1.13	3.2	6.7	37.6	54.4	1416	30.5	16.8	20.3	1.5	3.3	.66	26.4	.5
52D	43	B100W	116	7.2	7.3	250	75	91	.10	1.12	9.5	19.7	9.3	71.9		47.9	42.6	23.9	2.0	5.0	.44	35.4	.6
52D	43	B100W	151	6.4	6.0	45	71	92	.08	1.06	11.3	14.9	6.2	68.9		51.1	50.2	23.2	2.2	5.4	.30	34.8	.4
52D	43	B100W	142	6.5	6.4	75	64	88	.13	1.08	7.2	13.7	9.1	65.3		50.4	49.2	22.9	2.2	5.2	.84	32.3	.8
52D	43	B2600W	135	4.6	4.0	42	93	94	.06	1.05	15.7	29.2	4.6	83.0	4141	47.3	42.3	39.4	1.2	4.7	.20	42.0	.2
52D	43	B2600W	229	4.6	4.0	40	65	94	.06	1.08	16.1	25.6	2.8	75.1		52.1	51.0	52.1	1.0	5.7	.07	38.3	<.1
52D	43	B2600W	180	5.9	5.9	32	44	91	.09	1.02	9.8	11.9	2.1	67.6	4759	52.8	52.1	18.9	2.8	5.6	1.3	35.4	.1
52D	43	L700W+ 400N	180	6.3	6.1	78	85	90	.11	1.16	9.4	17.3	14.1	68.8	4014	45.8	40.5	32.7	1.4	4.8	.20	33.7	1.2
52D	43	L700W+ 400N	303	6.5	5.5	109	75	94	.06	1.05	14.9	19.0	5.9	69.6	4515	51.1	50.8	21.3	2.4	5.8	.23	34.6	<.1
52D	43	L700W+ 400N	173	6.3	5.7	53	61	89	.10	1.00	8.4	11.8	6.0	67.7		51.6	51.0	21.5	2.4	5.6	.46	33.9	.1
52D	43	L700W+ 400N	81	6.4	6.0	64	53	90	.10	1.04	8.6	11.0	6.7	67.1	4572	51.8	51.2	19.9	2.6	5.9	.52	32.5	.2
52D	43	L700W+ 400N	144	6.6	6.3	90	55	90	.10	1.02	8.9	13.9	6.6	67.8	4648	51.2	50.9	21.3	2.4	5.9	.86	33.0	.6
52D	32	B1600E	175	3.9	3.7	46	87	91	.12	1.29	9.7	20.0	6.2	77.6	4270	48.3	45.3	48.3	1.0	5.0	.09	39.4	<.1
52D	32	B1600E	116	3.7	3.6		69	94	.07	1.08	14.5	23.9	8.3	74.5	5187	48.2	46.3	80.3	.6	4.7	.10	38.1	<.1
52D	32	B1600E	119	5.1	4.9	61	53	91	.09	1.00	10.1	18.5	6.8	70.6	4881	53.8	52.7	33.6	1.6	5.9	.11	31.8	.1
52D	32	B1600E	97	4.6	5.6	38	45	90	.09	1.00	9.3	16.0	7.5	68.1	4842	52.3	52.0	20.9	2.5	5.9	.27	31.5	.2
52D	32	B1600E	107	6.3	6.0	62	53	91	.09	1.00	9.7	19.7	7.5	72.6	4874	52.9	52.1	21.2	2.5	5.6	.52	31.0	<.1
52D	32	B1600E	98	6.5	6.2	90	46	89	.11	1.02	8.3	15.5	10.1	67.8	4854	52.7	52.4	18.2	2.9	5.8	.84	27.7	<.1
52D	32	B1600E	97	6.6	6.4	93	30	87	.13	1.00	6.6	12.6	18.2	60.9	4411	48.6	46.3	18.0	2.7	5.0	.79	24.7	.1
52D	32	B1800E	75	6.2	5.8	64	74	90	.11	1.06	8.7	18.9	13.1	70.0	4155	45.6	41.9	28.5	1.6	4.5	.10	35.1	<.1
52D	32	B1800E	118	5.7	5.4	37	48	90	.09	1.00	9.2	12.0	11.1	68.1	4650	52.7	51.7	24.0	2.2	5.7	.15	28.2	<.1
52D	32	B1800E	134	5.6	5.3	56	47	90	.10	1.04	9.2	16.5	7.7	69.8	5022	55.6	54.1	32.7	1.7	6.0	.11	28.9	.6
52D	32	B1800E	99	6.1	5.7	50	44	92	.08	1.00	10.8	16.2	7.3	71.1	4786	53.5	53.0	25.5	2.1	6.0	.20	30.9	<.1
52D	32	B1800E	96	6.5	6.2	80	51		.10	1.06	8.8	16.0	9.5	68.1	4803	52.6	52.1	17.5	3.0	5.6	.95	28.4	<.1
52D	32	B1800E	121	6.5	6.2	96	33	88	.12	.99	7.1	9.8	13.7	64.8	4623	49.3	46.2	16.4	3.0	5.2	.69	28.1	.2
52D	17	B1900S	90	6.5	6.5	100	51	84	.16	1.06	5.4	8.7	17.2	63.9	3771	42.8	36.3	21.4	2.0	4.1	.17	33.7	.2
52D	17	B1900S	129	6.0	5.7	44	45	89	.11	1.06	8.2	10.8	8.9	68.1	4522	48.9	40.8	20.4	2.4	4.3	.20	35.3	<.1
52D	17	B1900S	111	6.3	6.1	52	39	90	.10	1.04	9.2	13.1	7.3	67.2	4646	50.7	48.7	16.4	3.1	4.9	.36	33.6	<.1
52D	17	B1200S	101	6.8	6.6	194	62	86	.14	.99	6.0	9.0			3810	43.9	40.0	19.1	2.3	4.2	.18	.589	2.2
52D	17	B1200S	125	6.1	5.7	71	47	88	.12	1.00	7.2	8.2	8.9	69.7	4430	49.1	47.6	21.4	2.3	5.5	.19	34.1	.4
52D	17	B1200S	122	5.9	5.8	59	42	88	.13	1.06	7.1	9.3	7.8		4554	50.8	48.3			5.2	.20	36.0	<.1

HG PPM	CA PPM	P PPM	K PPM	AL PPM	FE PPM	PB PPM	MN PPM	MG PPM	CU PMM	ZN PMM	TOP INT (CM)	BOT INT (CM)	HUM 1-9	PEAT TYPE S	C	L	X	REL POS	VEGETATION COVER T %	TS %	LS %	G %	SP %	FOR	SUB	SUR WAT PH	AV D-W CM
.17	15239	1540	3748	8085	7841	26	1922	4324	9	124	0	10	1	9	1	0	0	0	0	0	0	80	1	8	4	5.4	150
.08	21313	503	885	3091	3268	<2	123	4723	16	11	10	80	4	9	1	0	0	2	0	0	0	80	1	8	4	5.4	150
.04	23360	415	157	2053	3544	<2	93	4103	3	8	80	120	5	10	0	0	0	4	0	0	0	80	1	8	4	5.4	150
.43	20493	1435	3193	7838	7905	25	2307	4218	8	144	0	10	1	8	1	1	0	0	0	0	0	95	2	8	4	5.2	150
.04	24508	379	576	2085	2858	4	246	4107	4	6	10	110	5	8	1	1	0	2	0	0	0	95	2	8	4	5.2	150
.02	20919	344	307	2188	3584	<2	104	3497	3	4	110	150	5	10	0	0	0	4	0	0	0	95	2	8	4	5.2	150
.14	19100	1321	3471	2031	4204	24	2215	4511	4	60	0	10	1	8	1	1	0	0	0	70	0	40	30	3	3		
.04	25919	527	623	2079	3366	6	170	4339	4	16	10	100	3	8	1	1	0	1	0	70	0	40	30	3	3		
.01	33223	317	721	2401	4728	7	196	4286	4	3	100	150	4	8	0	2	0	3	0	70	0	40	30	3	3		
.01	30030	431	662	2757	5514	5	196	4139	6	6	150	200	6	10	0	0	0	4	0	70	0	40	30	3	3		
.01	24689	581	7608	19982	9459	16	205	5793	19	21	200	220						5	0	70	0	40	30	3	3		
.12	9435	572	2036	1741	1378	15	104	2981	3	60	0	10	1	10	0	0	0	0	33	7	5	25	80	4	4	5.2	38
.06	23436	581	930	2852	3031	9	147	4838	4	22	10	80	4	10	0	0	0	1	33	7	5	25	80	4	4	5.2	38
.03	32006	375	246	1466	3000	<2	115	4924	4	12	80	130	4	9	0	1	0	3	33	7	5	25	80	4	4	5.2	38
.02	34144	388	800	2815	5096	6	157	5023	11	17	130	200	5	10	0	0	0	4	33	7	5	25	80	4	4	5.2	38
.20	11652	926	2762	1950	6330	32	4259	4989	3	93	0	10	1	9	1	0	0	0	6	13	35	40	90	3	4	5.5	20
.07	17133	473	892	3114	5332	8	150	3681	5	30	10	120	3	9	1	0	0	1	6	13	35	40	90	3	4	5.5	20
.04	22710	479	358	1777	4140	<2	152	4143	1	4	120	230	3	10	0	0	0	2	6	13	35	40	90	3	4	5.5	20
.04	19752	544	169	1356	4149	<2	117	3866	1	8	230	300	3	10	0	0	0	3	6	13	35	40	90	3	4	5.5	20
.04	25603	785	1459	3643	8335	10	162	5435	9	30	300	360	4	9	0	1	0	4	6	13	35	40	90	3	4	5.5	20
.14	5408	588	2554	3328	2762	31	196	1601	8	48	0	5	1	10	0	0	0	0	3	0	65	7	95	1	5	4.7	44
.10	5103	620	1718	4339	2995	18	41	1668	5	35	5	20	3	10	0	0	0	1	3	0	65	7	95	1	5	4.7	44
.04	6507	590	698	3595	1389	7	16	1785	3	12	20	80	4	10	0	0	0	1	3	0	65	7	95	1	5	4.7	44
.03	12196	305	660	2041	1502	8	17	2963	3	5	80	120	3	10	0	0	0	2	3	0	65	7	95	1	5	4.7	44
.04	21433	441	422	2279	4455	<2	29	4165	2	9	120	260	4	8	2	0	0	3	3	0	65	7	95	1	5	4.7	44
.06	6535	497	2370	1797	1342	14	334	5717	3	53	0	10	1	10	0	0	0	0	0	0	22	70	55	3	5	5.5	7
.04	12732	407	474	2450	1527	3	48	5695	1	7	10	150	3	10	0	0	0	1	0	0	22	70	55	3	5	5.5	7
.03	13757	314	942	2776	2106	3	44	4580	1	6	150	220	3	10	0	0	0	3	0	0	22	70	55	3	5	5.5	7
.03	14587	223	650	2147	2945	<2	58	4494	3	14	220	280	3	10	0	0	0	3	0	0	22	70	55	3	5	5.5	7
.02	18233	319	623	2610	3080	<2	87	5265	1	13	280	320	3	10	0	0	0	4	0	0	22	70	55	3	5	5.5	7
.03	19228	396	717	3026	3230	<2	112	5702	6	15	320	360		8	2	0	0	4	0	0	22	70	55	3	5	5.5	7
.07	4430	712	3814	1431	1175	13	351	1631	4	46	0	5	1	10	0	0	0	0	25	0	40	9	89	4	5	4.3	44
.08	3216	772	2160	5115	2716	13	40	1512	4	28	5	20	2	10	0	0	0	1	25	0	40	9	89	4	5	4.3	44
.03	5635	490	778	2662	1407	4	27	1276	2	11	20	170	3	8	2	0	0	2	25	0	40	9	89	4	5	4.3	44
.03	13759	294	963	2785	2394	4	59	3176	3	11	170	260	3	9	1	0	0	3	25	0	40	9	89	4	5	4.3	44
.04	18469	324	1157	2928	3636	4	88	5077	7	13	260	320	3	9	1	0	0	4	25	0	40	9	89	4	5	4.3	44
.04	20640	345	1273	4557	5577	<2	98	5789	9	18	320	340	4	8	2	0	0	4	25	0	40	9	89	4	5	4.3	44
.08	4572	530	2698	1975	2337	16	314	2948	3	42	0	10	1	10	0	0	0	0	14	0	50	25	95	1	5	5.0	24
.09	19618	476	871	2728	2500	11	68	4665	4	19	10	180	3	10	0	0	0	1	14	0	50	25	95	1	5	5.0	24
.04	10004	285	503	2007	1298	3	36	3105	<1	4	180	200	3	6	4	0	0	3	14	0	50	25	95	1	5	5.0	24
.04	16034	218	388	1712	1767	<2	77	4635	<1	22	200	310	3	8	2	0	0	3	14	0	50	25	95	1	5	5.0	24
.07	16137	304	649	2504	2640	<2	102	4730	4	10	310	370	4	8	2	0	0	4	14	0	50	25	95	1	5	5.0	24
.24	17652	970	2832	1721	22328	11	6326	3940	4	305	0	10	1	8	1	1	0	0	0	2	76	18	60	3	4	5.7	20
.06	24797	538	986	2853	7039	8	1061	4195	5	96	10	110	4	6	1	3	0	2	0	2	76	18	60	3	4	5.7	20
.06	30707	364	996	3828	10159	<2	545	5276	15	21	110	130	6	9	0	1	0	4	0	2	76	18	60	3	4	5.7	20
.13	5901	750	3557	936	1652	13	503	2628	4	30	0	10	1	10	0	0	0	0	17	0	36	35	40	3	5	5.2	27
.10	9006	711	794	2104	1534	9	195	2812	4	26	10	60	2	10	0	0	0	1	17	0	36	35	40	3	5	5.2	27
.06	18467	576	1045	2566	1296	21	196	3648	7	22	60	130	3	7	0	3	0	2	17	0	36	35	90	3	5	5.2	27
.05	24105	395	220	1724	1418	<2	113	5446	1	6	130	210	4	10	0	0	0	4	17	0	36	35	90	3	5	5.2	27
.20	26840	860	2699	3333	2463	28	398	3928	7	72	0	10	1	9	0	1	0	0	39	1	12	1	85	4	3	5.1	24
.07	53356	588	1247	2536	4408	13	355	6263	6	28	10	80	4	9	0	1	0	1	39	1	12	1	85	4	3	5.1	24
.08	69380	572	3135	994	9667	87	51	5896	23	27	80	160	4	9	0	1	0	3	39	1	12	1	85	4	3	5.1	24
.06	66832	522	4409	789	5420	138	251	6747	33	24	160	200						5	39	1	12	1	85	4	3	5.1	24
.21	17373	1305	3849	1956	6810	23	1230	4720	5	45	0	10	1	8	0	2	0	0	10	40	25	38	50	6	4	5.7	13
.09	21938	550	661	1771	2072	9	139	4395	5	12	10	150	2	4	0	6	0	1	10	40	25	38	50	6	4	5.7	13
.06	28421	521	542	2730	4193	<2	256	5421	8	20	150	360	3	7	0	3	0	3	10	40	25	38	50	6	4	5.7	13
.06	4127	611	2311	1731	2241	20	249	2822	3	60	0	10	1	10	0	0	0	0	18	3	38	20	95	1	6	5.3	27
.03	4211	357	277	1412	738	4	13	3852	2	6	10	350	3	10	0	0	0	2	18	3	38	20	95	1	6	5.3	27
.06	14440	558	510	2087	3217	<2	83	4491	7	30	350	450	3	8	2	0	0	4	18	3	38	20	95	1	6	5.3	27
.10	11294	624	3548	5992	9741	22	1261	5112	7	67	0	10	1	6	4	0	0	0	3	9	15	60	85	3	4	5.7	27
.06	17177	533	764	2363	2099	2	162	4139	4	12	10	120	2	3	7	0	0	1	3	9	15	60	85	3	4	5.7	27
.04	22600	431	437	1343	894	3	75	4995	5	16	120	220	3	3	7	0	0	2	3	9	15	60	85	3	4	5.7	27
.04	21689	483	350	1565	1162	<2	94	5179	3	12	220	310	3	7	3	0	0	2	3	9	15	60	85	3	4	5.7	27
.04	21070	451	381	1545	1232	2	138	5424	3	17	310	530	4	10	0	0	0	4	3	9	15	60	85	3	4	5.7	27
.13	2327	633	2256	2007	2327	17	174	1101	4	63	0	20	1	10	0	0	0	0	25	0	60	10	95	1	5	4.5	33
.08	2710	496	963	2721	1575	9	34	1247	4	22	20	130	2	10	0	0	0	1	25	0	60	10	95	1	5	4.5	33
.04	8100	417	470	1991	938	<2	14	2957	2	5	130	200	4	10	0	0	0	2	25	0	60	10	95	1	5	4.5	33
.09	11178	325	515	2329	1458	<2	32	2858	2	6	200	260	3	6	4	0	0	3	25	0	60	10	95	1	5	4.5	33
.04	12595	277	408	1798	1920	<2	38	3128	2	6	260	310	3	4	6	0	0	3	25	0	60	10	95	1	5	4.5	33
.03	16488	284	645	2342	3580	<2	57	3872	3	15	310	370	4	8	2	0	0	4	25	0	60	10	95	1	5	4.5	33
.04	21612	444	2593	8190	7538	4	79	5492	13	18	370	390	5	10	0	0	0	4	25	0	60	10	95	1	5	4.5	33
.34	9389	679	2436	2448	8078	47	2218	4847	4	56	0	20	1	10	0	0	0	0	3	0	21	46	80	3	5	5.5	17
.06	10041	644	1442	3593	1934	7	255	4574	6	19	20	70	3	7	3	1	0	1	3	0	21	46	80	3	5	5.5	17
.05	9738	536	697	2457	1196	<2	76	3986	3	5	70	150	4	8	1	1	0	1	3	0	21	46	80	3	5	5.5	17
.03	11305	378	597	2210	1291	<2	66	3278	2	4	150	280	3	3	7	0	0	3	3	0	21	46	80	3	5	5.5	17
.06	15733	295	669	2107	2922	<2	54	3942	3	6	280	340	4	6	4	0	0	4	3	0	21	46	80	3	5	5.5	17
.06	20608	393	1314	4202	5733	<2	66	5053	8	14	340	390	5	9	1	0	0	4	3	0	21	46	80	3	5	5.5	17
.32	17607	1027	3388	6071	6478	33	2421	4278	10	90	0	10	1	7	2	1	0	0	0	4	15	50	15	8	3	5.8	5
.07	20535	669	798	3179	4096	48	277	3854	5	15	10	110	3	7	2	1	0	2	0	4	15	50	15	8	3	5.8	5
.10	20790	516	325	2001	5299	<2	151	3462	4	12	110	210	4	8	2	0	0	4	0	4	15	50	15	8	3	5.8	5
.27	23415	1168	2877	5403	12523	32	2329	5277	8	111	0	10	1	9	0	1	0	0	0	55	35	15	85	8	3	5.7	15
.11	19746	621	827	3283	4741	2	342	3857	8	48	10	70	4	9	0	1	0	2	0	55	35	15	85	8	3	5.7	15
.06	21279	529	470	2462	6523	<2	205	3965	7	47	70	130	5	10	0	0	0	4	0	55	35	15	85	8	3	5.7	15

APPENDIX B.2 PHYSICAL AND CHEMICAL CHARACTERISTICS OF PEAT SAMPLES FROM DRYDEN-LAC SEUL AREA. (Refer to Section 3.5 for sources and context of data.)

NTS	PEAT LAND NO.	SAMPLE POINT LOCATION	CAT EX CAP	H2O PH	CACL2 PH	COND	FIB %	MC % WET	DRY BULK DENS	WET BULK DENS	VAL ABSO	CAP ABSO	ASH %	VOL %	NET CAL /G	C TTL %	C ORG %	C:N	N %	H %	S %	O %	AS PPM
52F	113	L4100N+1800E	50	4.9	4.5	164	61	93	.07	.99	12.9	27.5	11.6	72.4	4036	45.2	43.2	28.3	1.6	3.9	.08	37.7	0.3
52F	113	L4100N+1800E	233	5.5	4.1	17	75	91	.10	1.04	9.9	17.5	5.9	70.2	4740	56.6	55.2	24.6	2.3	6.1	.18	28.9	<.1
52F	113	L4100N+1800E	212	4.6	4.4	<10	70	91	.10	1.05	10.0	15.9	6.8	67.7	4826	55.8	53.8	25.4	2.2	5.9	.06	29.3	<.1
52F	113	L4100N+1800E	148	5.2	4.4	25	51	88	.13	1.06	7.1	14.1	9.8	66.3	4722	54.4	54.0	27.2	2.0	6.0	.12	27.6	<.1
52F	113	F300W	255	4.8	4.5	99	93	93	.07	1.05	13.3	28.4	10.9	68.9	3972	47.2	46.0	31.5	1.5	5.1	.08	35.2	<.1
52F	113	F300W	178	5.8	4.7	25	76	89	.12	1.07	8.3	12.9	7.0	69.1	4592	57.1	55.8	26.0	2.2	5.9	.08	27.8	<.1
52F	113	F300W	170	5.5	5.1	27	66	88	.13	1.10	7.2	11.9	7.7	67.0	4428	56.6	55.2	33.3	1.7	5.8	.04	28.1	0.3
52F	113	F300W	104	5.6	5.1	38	44	79	.24	1.14	3.7	5.5	19.9	53.4	3868	44.1	41.4	36.8	1.2	4.3	.08	30.4	<.1
52F	113	L1600N+1300W	137	4.4	4.0	112	75	92	.08	1.07	11.8	24.7	6.7	74.3	4577	51.2	50.0	34.1	1.5	5.3	.04	35.3	0.1
52F	113	L1600N+1300W	199	4.8	4.1	18	50	89	.11	1.03	8.0	13.7	6.3	58.8	4940	53.0	51.8	26.5	2.0	5.5	.01	33.2	<.1
52F	113	L1600N+1300W	110	5.2	4.3	23	49	88	.13	1.04	7.1	13.1	7.3	71.1	5081	57.0	55.9	25.9	2.2	5.9	.02	27.6	<.1
52F	113	L1600N+1300W	198	5.2	4.3	30	49	87	.14	1.10	6.7	11.9	39.8	41.9	3030	36.9	35.3	20.5	1.8	3.2	.08	18.2	<.1
52F	113	L1600N+2000E	199	4.2	3.7	168	99	94	.06	1.00	15.4	33.9	6.5	78.3	4193	46.7	44.8	42.5	1.1	4.8	.04	40.9	<.1
52F	113	L1600N+2000E	214	4.7	3.8	27	48	90	.10	1.04	9.0	16.4	6.3	69.3	4854	54.2	53.6	22.6	2.4	5.9	.01	31.2	0.1
52F	113	L1600N+2000E	183	5.0	3.9	31	45	89	.12	1.05	7.8	12.2	6.9	67.2	5098	54.0	53.0	27.0	2.0	5.4	.08	31.6	0.5
52F	113	L1600N+2000E	157	5.5	4.3	40	40	86	.15	1.06	6.1	11.0	11.6	62.3	4711	46.6	44.8	23.3	2.0	5.2	.08	34.5	0.1
52F	113	L1600N+2000E	157	5.2	4.6	45	55	87	.14	1.06	6.6	11.4	12.3	66.4	4526	53.1	51.9	26.6	2.0	5.1	.32	27.2	<.1
52F	36	B600W	297	3.9	3.4	86	99	94	.06	1.01	15.7	35.6	4.2	77.2	4363	45.4	43.2	50.4	0.9	3.9	.01	45.6	0.3
52F	36	B600W	191	3.9	3.4	104	99	94	.06	1.02	16.9	36.9	5.3	79.6	4215	48.0	47.0	48.0	1.0	4.8	.04	40.9	0.4
52F	36	B600W		4.1	3.7	24	65	91	.09	1.05	10.2	19.0	4.2	70.7	4892	54.6	52.2	39.0	1.4	5.6	.01	34.2	<.1
52F	36	B600W	174	4.4	3.8	20	69	91	.09	1.04	10.4	19.2	3.3	71.8	4869	55.1	53.9	36.7	1.5	5.9	.06	34.1	0.4
52F	36	B600W	183	4.7	4.1	29	76	88	.13	1.08	7.3	12.9	5.9	63.2	4527	54.2	53.1	45.2	1.2	5.6	.11	33.0	<.1
52F	36	B600W	120	5.3	4.4	41	52	82	.20	1.09	4.4	8.0	26.9	52.3	3668	39.8	37.6	24.9	1.6	3.9	.10	27.7	0.3
52F	36	B100W	211	4.4	3.7	198	93	94	.06	1.01	15.4	34.3	3.4	77.5	4056	45.6	44.8	45.6	1.0	4.9	.04	45.1	<.1
52F	36	B100W	136	4.1	4.0	37	86	95	.06	1.02	17.2	38.5	8.5	74.8	4268	45.1	44.6	28.2	1.6	4.6	.01	40.2	0.1
52F	36	B100W	129	5.7	5.1	47	56	88	.13	1.07	7.2	10.8	9.7	66.8	4538	51.0	49.8	24.8	2.1	5.1	.05	32.2	<.1
52F	36	B100W	163	5.9	5.2	49	66	92	.09	1.05	11.0	20.7	5.8	65.5	4778	51.2	50.0	23.3	2.2	5.5	.30	35.0	<.1
52F	36	B100W	176	5.7	5.0	57	73	93	.08	1.05	12.7	23.7	5.6	70.9	4744	50.4	48.4	24.0	2.1	5.3	.10	36.5	<.1
52F	57	B300N	56	4.9	3.8	246	96	92	.08	1.02	12.0	25.5	10.9	70.0	4293	49.3	47.0	35.2	1.4	5.0	.08	33.3	<.1
52F	57	B300N		4.7	4.2	65	50	90	.11	1.05	8.5	12.5	8.3	70.7	4727	50.0	49.6	21.7	2.3	5.0	.01	34.4	0.3
52F	57	B300N	185	5.6	4.4	48	56	90	.11	1.05	8.6	12.5	6.6	66.1	4804	53.1	52.4	33.2	1.6	5.6	.02	33.1	<.1
52F	57	B300N	151	5.8	4.4	54	61	89	.12	1.06	8.2	12.0	9.3	67.9	4554	53.4	52.4	35.6	1.5	5.3	.04	30.5	<.1
52F	57	B300N	188	5.6	4.8	45	51	83	.18	1.09	5.0	7.7	9.7	65.4	4224	49.2	47.0	30.8	1.6	5.0	.04	34.5	<.1
52F	57	B1800N	265	5.0	4.8	88	69	92	.08	1.05	11.8	19.5	12.7	69.4	4220	47.8	45.3	39.8	1.2	5.4	.08	32.8	<.1
52F	57	B1800N	151	5.7	5.1	37	62	86	.15	1.06	6.3	11.0	7.7	67.6	4535	50.5	49.0	31.6	1.6	5.0	.03	35.2	<.1
52F	57	B1800N	194	5.8	5.4	39	58	87	.14	1.06	6.8	10.8	8.6	63.0	4463	51.4	49.8	32.1	1.6	5.6	.05	32.7	<.1
52F	57	B1800N	195	6.6	5.6	78	45	82	.20	1.08	4.5	8.1	15.0	61.0	3957	47.8	45.7	23.9	2.0	5.5	.36	29.3	<.1
52F	60	B3200E	353	5.6	4.7	45	71	92	.09	1.04	11.0	19.2	9.9	66.3	4846	49.8	48.0	22.6	2.2	5.1	.08	32.9	8.1
52F	60	B3200E	111	5.5	4.7	23	64	89	.11	1.05	8.2	12.4	10.3	68.5	4558	52.7	51.6	31.0	1.7	5.4	.04	29.9	5.2
52F	60	B1500E	196	4.3	3.2	55	99	95	.05	1.00	18.6	43.0	3.8	77.3	4133	45.8	43.6	65.4	0.7	4.8	.01	44.9	<.1
52F	60	B1500E	278	4.0	3.0	12	82	94	.07	1.03	14.9	24.5	4.0	77.7	4388	50.0	49.8	45.5	1.1	5.4	.04	39.5	<.1
52F	60	B1500E	227	4.1	3.0	<10	76	94	.07	1.03	14.9	22.2	2.7	71.2	4838	47.4	45.0	36.5	1.3	5.4	.01	43.2	<.1
52F	60	B1500E	215	4.4	3.4	18	74	93	.08	1.04	12.7	20.9	2.6	73.7	4820	54.7	53.2	45.6	1.2	5.2	.04	36.3	0.2
52F	60	B1500E	162	4.5	3.3	19	64	90	.10	1.03	9.1	17.0	4.0	73.6	4998	54.8	53.0	42.2	1.3	5.4	.02	34.5	<.1
52F	60	B1500E	174	5.3	3.4	39	70	89	.12	1.04	8.0	17.1	5.1	70.0	4940	54.2	52.6	30.1	1.8	5.8	.04	33.1	<.1
52F	60	B1500E	212	4.7	3.5	29	56	89	.12	1.05	8.0	13.0	7.7	68.3	4797	51.4	50.9	28.6	1.8	5.4	.04	33.7	<.1
52F	60	L2500E+200S	189	4.3	3.9	38	87	93	.07	1.00	13.7	28.5	3.5	76.5	4291	48.8	47.3	54.2	0.9	5.0	.03	41.8	0.2
52F	60	L2500E+200S	201	4.0	3.1	17	61	92	.08	1.03	11.8	20.3	3.7	73.0	4371	50.8	49.8	42.3	1.2	5.2	.05	39.0	0.1
52F	60	L2500E+200S	236	4.0	3.0	12	72	93	.07	1.03	13.7	25.1	2.7	78.1	4783	48.8	48.0	44.4	1.1	4.8	.03	42.6	<.1
52F	60	L2500E+200S	221	4.8	3.4	31	69	92	.09	1.03	10.9	20.6	2.7	72.1	4956	50.4	50.0	50.4	1.0	5.5	.06	40.3	<.1
52F	60	L2500E+200S	171	4.4	3.5	24	61	91	.10	1.05	9.9	21.5	4.4	73.8	4900	53.2	51.9	44.3	1.2	5.7	.05	35.4	<.1
52F	60	L2500E+200S	189	4.8	3.9	37	60	87	.14	1.06	6.7	14.9	7.8	64.7	4813	48.1	47.1	26.7	1.8	5.0	.04	37.3	0.2
52F	60	L200E+100S	115	5.6	4.7	79	64	88	.13	1.05	7.1	13.2	34.0	73.0	2951	37.6	35.9	28.9	1.3	4.1	.04	23.0	0.8
52F	60	L200E+100S	138	5.6	4.2	20	64	90	.11	1.05	8.9	15.0	11.2	65.8	4692	51.2	50.0	23.3	2.2	5.5	.06	29.8	2.9
52F	60	L200E+100S	206	4.7	5.3	17	63	91	.09	1.05	10.1	17.7	10.2	69.9	4719	53.8	53.0	23.4	2.3	5.7	.03	28.0	0.9
52F	60	L200E+100S	175	6.0	4.9	23	63	91	.10	1.05	9.6	15.6	10.1	71.7	4831	52.3	51.7	21.8	2.4	5.7	.01	29.5	<.1
52F	60	L200E+100S	146	5.4	4.1	32	64	92	.09	1.03	11.0	12.8	11.8	67.0	4339	50.1	49.2	23.9	2.1	5.1	.08	30.8	<.1
52F	60	L200E+100S	192	5.8	4.8	37	65	91	.09	1.04	10.0	17.5	11.9	65.1	4327	55.0	53.9	28.9	1.9	5.4	.08	25.7	<.1
52F	60	L200E+100S	158	6.2	5.3	46	67	89	.12	1.06	7.8	11.3	16.0	60.9	4175	48.6	46.4	27.0	1.8	4.4	.18	29.0	0.3
52F	60	L200E+100S	110	6.1	6.2	298	48	87	.14	1.07	6.9	11.7	37.0	50.1	3157	37.4	35.7	28.8	1.3	3.5	.92	19.9	0.9

HG PPM	CA PPM	P PPM	K PPM	AL PPM	FE PPM	PB PPM	MN PPM	MG PPM	CU PMM	ZN PMM	TOP INT (CM)	BOT INT (CM)	HUM 1-9	PEAT TYPE S	C	L	X	REL POS	VEGETATION COVER T %	TS %	LS %	G %	SP %	FOR	SUB	SUR WAT PH	AV D-W CM
<.03	7900	620	2300	3400	23800	16	930	1180	<1	38	0	50	3	0	10	0	0	1	2	0	10	90	85	3	3	5.1	31
<.03	5900	530	600	4800	6700	<2	100	660	9	4	50	100	5	0	10	0	0	2	2	0	10	90	85	3	3	5.1	31
<.03	7000	480	700	4500	7800	<2	125	720	8	4	100	160	6	0	10	0	0	3	2	0	10	90	85	3	3	5.1	31
<.03	9400	480	1100	7200	9000	<2	155	890	11	<2	160	200	7	0	9	1	0	4	2	0	10	90	85	3	3	5.1	31
.05	17600	730	2600	3000	4500	4	420	920	5	20	0	50	3	2	3	5	0	1	18	2	20	8	95	3	3	5.3	33
.05	24000	470	400	2800	4400	<2	45	380	4	2	50	80	4	0	4	6	0	2	18	2	20	8	95	3	3	5.3	33
.06	24200	350	500	3400	5700	<2	45	400	5	<2	80	100	5	0	4	6	0	3	18	2	20	8	95	3	3	5.3	33
.05	29100	420	2600	13600	10000	<2	80	1140	16	<2	100	120	6	0	3	7	0	4	18	2	20	8	95	3	3	5.3	33
.03	4500	620	1200	3400	2400	8	50	590	3	24	0	50	3	9	1	0	0	1	11	0	11	14	97	1	5	3.7	16
<.03	8000	450	800	4000	3900	<2	20	480	3	4	50	100	7	1	7	2	0	2	11	0	11	14	97	1	5	3.7	16
<.03	7800	470	900	5400	6600	<2	20	590	4	2	100	150	8	1	7	2	0	4	11	0	11	14	97	1	5	3.7	16
.04	11100	560	6100	27400	12000	<2	100	2000	33	12	150	190						5	11	0	11	14	97	1	5	3.7	16
.05	3400	690	2300	2400	2200	6	120	950	2	38	0	30	2	9	1	0	0	1	10	0	10	8	98	1	3	4.5	18
<.03	5300	620	700	3500	2400	<2	15	500	1	6	30	70	4	1	9	0	0	1	10	0	10	8	98	1	3	4.5	18
.03	8100	470	800	4700	4000	30	10	680	<1	6	70	110	5	0	8	2	0	2	10	0	10	8	98	1	3	4.5	18
<.03	12100	450	1300	8600	6400	<2	2	1110	<1	6	110	180	6	0	9	1	0	3	10	0	10	8	98	1	3	4.5	18
<.03	15900	260	1400	7800	7600	<2	30	1310	5	14	180	230	8	0	10	0	0	4	10	0	10	8	98	1	3	4.5	18
<.03	1100	670	2700	1200	1100	4	45	570	1	38	0	20	2	9	1	0	0	1	7	0	15	8	90	1	5	4.0	24
<.03	1300	570	1300	2800	1200	10	10	400	11	30	20	40	3	8	2	0	0	1	7	0	15	8	90	1	5	4.0	24
<.03	2100	430	300	2500	600	<2	5	210	8	6	40	120	4	2	7	1	0	2	7	0	15	8	90	1	5	4.0	25
.05	5500	380	300	3000	900	14	5	380	1	8	120	180	5	2	5	3	0	3	7	0	15	8	90	1	5	4.0	25
.03	15800	220	400	3300	2100	<2	25	990	3	4	180	240	5	7	3	0	0	4	7	0	15	8	90	1	5	4.0	25
<.03	17100	370	4500	22000	7400	<2	105	2860	<1	18	240	310						5	7	0	15	8	90	1	5	4.0	25
.03	4300	810	3200	900	1100	4	170	1150	1	48	0	30	2	2	8	0	0	1	0	1	15	60	70	1	5	4.0	2
.08	3800	810	900	3100	1700	8	55	680	2	24	30	50	4	1	2	7	0	1	0	1	15	60	70	1	5	4.0	2
.04	18550	780	1300	7950	3450	<2	110	1605	6	22	50	200	5	2	0	8	0	2	0	1	15	60	70	1	5	4.0	2
<.03	20800	400	400	2300	3100	<2	125	1600	1	6	200	230	5	5	2	3	0	3	0	1	15	60	70	1	5	4.0	2
.04	17600	330	500	2300	3000	<2	115	1550	<1	8	230	270	4	5	4	1	0	4	0	1	15	60	70	1	5	4.0	2
.08	6500	740	1900	4900	6200	6	140	1370	2	24	0	30	1	10	0	0	0	0	8	0	10	8	99	2	5	5.0	16
<.03	7600	970	800	6300	2800	<2	60	1280	2	10	30	70	5	0	9	1	0	1	8	0	10	8	99	2	5	5.0	16
<.03	12400	660	400	5400	2600	<2	50	1450	4	4	70	100	7	1	8	1	0	2	8	0	10	8	99	2	5	5.0	16
<.03	18300	610	800	6200	3800	<2	85	1930	4	6	100	150	5	1	8	1	0	3	8	0	10	8	99	2	5	5.0	16
.03	25100	400	800	5600	5500	<2	145	2310	7	4	150	190	7	1	8	1	0	4	8	0	10	8	99	2	5	5.0	16
<.03	11600	690	1200	3700	2600	6	155	2300	2	20	0	30	3	10	0	0	0	1	12	0	25	5	99	1	5	5.1	30
.05	19200	640	600	3900	1900	<2	85	2150	3	10	30	60	4	2	7	1	0	1	12	0	25	5	99	1	5	5.1	30
<.03	26100	470	600	3500	2400	<2	120	2400	2	8	60	230	5	1	7	2	0	3	12	0	25	5	99	1	5	5.1	30
<.03	44200	400	1300	5700	7700	<2	410	3140	15	4	230	270	6	2	6	2	0	4	12	0	25	5	99	1	5	5.1	30
<.03	10300	610	800	2600	29500	<2	255	480	<1	38	0	120	3	0	10	0	0	2	4	0	15	43	92	3	3	5.9	10
.04	16400	450	700	2800	26900	<2	320	520	<1	12	120	210	4	0	10	0	0	4	4	0	15	43	92	3	3	5.9	10
<.03	1800	370	1100	1800	1500	14	130	660	1	50	0	60	2	10	0	0	0	1	5	0	15	11	96	1	3	4.1	25
<.03	1600	400	400	2200	800	<2	10	310	1	12	60	100	3	8	2	0	0	1	5	0	15	11	96	1	3	4.1	25
.03	1800	380	200	2000	1100	<2	10	240	4	4	100	150	4	6	4	0	0	2	5	0	15	11	96	1	3	4.1	25
<.03	1800	320	200	1900	900	<2	5	240	2	2	150	200	6	6	4	0	0	2	5	0	15	11	96	1	3	4.1	25
<.03	3400	310	300	2700	2700	<2	15	240	1	4	200	260	6	3	7	0	0	3	5	0	15	11	96	1	3	4.1	25
<.03	5200	380	500	3900	5400	<2	25	290	<1	8	260	340	6	0	9	1	0	3	5	0	15	11	96	1	3	4.1	25
<.03	8900	360	900	5100	11200	<2	70	430	2	142	340	400	8	0	9	1	0	4	5	0	15	11	96	1	3	4.1	25
<.03	1600	540	1200	2100	1400	48	65	540	3	36	0	60	2	10	0	0	0	1	10	0	20	2	99	1	3	3.5	19
<.03	1400	490	600	3500	900	2	5	260	1	<2	60	110	3	8	2	0	0	1	10	0	20	2	99	1	3	3.5	19
<.03	1400	300	300	1800	800	<2	5	230	7	8	110	200	6	5	5	0	0	2	10	0	20	2	99	1	3	3.5	19
.03	2300	300	200	2000	1000	2	5	220	2	6	200	240	5	5	5	0	0	3	10	0	20	2	99	1	3	3.5	19
.06	4500	330	400	3700	2200	<2	10	260	2	6	240	300	6	5	4	1	0	3	10	0	20	2	99	1	3	3.5	19
<.03	9800	330	1100	6100	6400	<2	20	470	9	6	300	370	7	1	7	2	0	4	10	0	20	2	99	1	3	3.5	19
.04	10300	640	1300	2600	17040	<2	1325	560	7	44	0	30	1	1	9	0	0	0	8	0	6	10	98	3	3	7.0	6
<.03	17500	690	800	2800	34200	<2	235	560	<1	106	30	100	3	0	9	1	0	1	8	0	6	10	98	3	3	7.0	6
<.03	20600	640	900	3500	21200	<2	250	670	<1	18	100	200	7	0	10	0	0	1	8	0	6	10	98	3	3	7.0	6
<.03	22100	550	700	2800	22200	<2	265	670	14	6	200	300	8	1	9	0	0	2	8	0	6	10	98	3	3	7.0	6
.10	26800	450	1000	3900	21400	<2	305	880	<1	4	300	400	8	1	9	0	0	3	8	0	6	10	98	3	3	7.0	6
.07	29900	450	600	3000	23900	<2	345	790	3	2	400	500	8	2	7	1	0	3	8	0	6	10	98	3	3	7.0	6
.03	32200	430	800	3500	30400	<2	3545	840	3	6	500	600	8	2	7	1	0	4	8	0	6	10	98	3	3	7.0	6
<.03	47400	440	2700	13600	54200	86	1460	1730	<1	14	609	700						5	8	0	6	10	98	3	3	7.0	6

APPENDIX B.2 DRYDEN-LAC SEUL AREA (CONTINUED).

NTS	PEAT LAND NO.	SAMPLE POINT LOCATION	CAT EX CAP	H2O PH	CACL2 PH	COND	FIB %	MC % WET	DRY BULK DENS	WET BULK DENS	VAL ABSO	CAP ABSO	ASH %	VOL %	NET CAL /G	C TTL %	C ORG %	C:N	N %	H %	S %	O %	AS PPM
52K	85	B700S	56	5.7	4.7	82	86	91	.09	1.02	10.1	20	17.0	67.4	4065	44.1	43.2	24.5	1.8	4.4	.11	32.6	.6
52K	85	B700S	113	6.1	5.6	32	65	92	.08	1.02	11.2	16	7.4	70.7	4615	52.8	50.6	20.3	2.6	5.4	.02	31.8	.1
52K	85	B700S	107	5.9	5.9	59	75	91	.10	1.03	9.8	14	7.5	67.3	4707	50.2	49.0	21.8	2.3	5.1	.07	34.8	<.1
52K	85	B700S	159	6.1	5.9	72	53	87	.14	1.05	6.7	9	10.7	62.7	4976	51.6	50.2	28.7	1.8	5.6	.03	30.3	.2
52K	85	B700S	121	6.3	6.2	77	57	90	.10	1.04	9.0	13	11.1	63.3	4536	52.1	51.8	22.7	2.3	5.6	.08	27.0	<.1
52K	85	B700S	161	5.4	5.5	74	73	92	.08	1.01	10.9	21	10.7	64.6	4221	51.5	51.0	24.5	2.1	4.9	.06	30.7	<.1
52K	85	B700S	118	5.9	5.9	66	74	90	.10	1.02	8.7	15	17.1	60.8	4301	48.1	46.4	20.9	2.3	4.6	.06	27.9	<.1
52K	85	B100S	141	4.6	3.7	43	94	93	.07	1.03	13.1	25	8.5	75.1	4232	46.1	45.2	32.9	1.4	4.8	.04	39.2	<.1
52K	85	B100S	106	5.0	3.8	20	82	93	.08	1.04	12.5	23	3.6	75.3	4834	52.4	51.2	29.1	1.8	5.7	.01	36.5	.1
52K	85	B100S	144	5.2	4.3	26	63	90	.10	1.04	9.1	15	4.9	69.0	4932	55.0	54.2	26.2	2.1	4.7	.04	33.2	<.1
52K	85	B100S	145	5.0	4.9	39	52	86	.15	1.07	6.0	7	4.1	64.2	4605	53.1	50.0	31.2	1.7	5.6	.08	35.5	<.1
52K	85	B100S	158	5.6	5.0	78	63	83	.22	1.34	5.0	6	14.9	61.6	4174	49.2	47.4	37.8	1.3	5.0	.70	28.9	.3
52K	85	L1900S+ 200E	181	4.1	3.5	244	95	91	.09	1.05	10.5	24	5.7	77.2	4254	48.4	47.1	37.2	1.3	5.5	.04	39.0	<.1
52K	85	L1900S+ 200E	135	4.2	3.8	65	56	91	.09	1.05	10.1	12	12.0	70.4	4393	48.1	47.0	32.1	1.5	5.5	.01	32.9	<.1
52K	85	L1900S+ 200E	112	4.6	3.5	31	46	87	.14	1.06	6.5	7	6.7	71.4	4923	53.4	52.2	41.1	1.3	5.6	.02	33.0	<.1
52K	85	L1900S+ 200E	128	5.0	4.0	25	60	89	.11	1.05	8.4	14	4.6	71.5	5173	57.8	57.0	27.5	2.1	5.4	.01	30.1	<.1
52K	85	L1900S+ 200E	128	5.8	4.9	41	61	88	.13	1.06	7.1	10	8.2	66.3	4716	53.8	51.9	26.9	2.0	4.9	.04	31.0	.1
52K	85	L1900S+ 200E	137	5.7	5.6	52	45	82	.20	1.09	4.5	7	13.9	62.7	4330	49.1	47.6	24.6	2.0	5.5	.22	29.3	<.1
52K	86	B1000S	103	5.1	4.3	345	95	88	.12	1.04	7.5	13	8.8	71.2	4164	47.1	46.6	27.7	1.7	4.9	.04	37.5	<.1
52K	86	B1000S	129	5.2	4.5	25	74	88	.13	1.05	7.2	8	8.7	69.6	4599	51.5	50.8	28.6	1.8	5.0	.01	33.0	<.1
52K	86	B1000S	122	5.3	5.0	28	64	88	.12	1.06	7.5	11	7.2	68.5	4660	52.8	52.0	26.4	2.0	5.7	.04	32.2	.1
52K	86	B1000S	128	5.9	5.0	58	58	88	.13	1.06	7.1	10	9.5	64.6	4475	53.2	52.4	26.6	2.0	5.7	.11	29.5	<.1
52K	86	B1000S	124	6.1	5.4	54	57	87	.14	1.08	6.9	10	11.6	63.4	4461	52.8	52.0	24.0	2.2	5.5	.29	27.6	.1
52K	86	B1000S	70	5.7	5.1	50	44	78	.25	1.12	3.5	8	67.7	25.9	1216	16.7	12.6	23.9	.7	5.1	.22	9.6	.1
52K	86	B300S	232	5.0	2.9	85	99	93	.08	1.02	12.5	29	3.5	80.1	4264	47.6	45.6	52.9	.9	4.9	.01	43.1	<.1
52K	86	B300S	139	3.9	3.2	<10	78	93	.07	1.02	13.9	22	2.3	74.4	4807	53.4	51.8	59.3	.9	4.9	.04	38.4	<.1
52K	86	B300S	91	4.8	3.9	30	53	90	.11	1.05	8.8	15	4.9	71.9	4984	55.2	54.0	30.7	1.8	5.2	.05	32.8	<.1
52K	86	B300S	132	5.6	4.4	45	58	89	.11	1.05	8.3	14	7.3	62.4	4786	57.5	56.9	27.4	2.1	5.1	.01	28.0	<.1
52K	86	B300S	180	5.5	4.9	65	45	85	.17	1.09	5.5	13	16.1	59.9	4170	48.1	47.1	22.9	2.1	4.4	.12	29.2	<.1
52K	20	B900E	161	3.7	3.0	110	93	91	.09	1.02	10.6	22	6.0	72.6	4396	51.0	50.2	28.3	1.8	5.5	.01	35.7	<.1
52K	20	B900E	535	3.8	3.3	<10	61	91	.10	1.04	9.9	17	3.3	75.7	4580	50.0	48.9	38.5	1.3	5.0	.04	40.3	<.1
52K	20	B900E	293	5.0	3.5	62	63	91	.10	1.05	9.5	14	2.7	73.1	4820	56.1	55.1	46.8	1.2	5.2	.03	34.8	<.1
52K	20	B900E	227	4.6	4.3	133	54	90	.11	1.04	8.6	14	4.5	70.5	4793	55.6	53.0	34.8	1.6	5.1	.02	33.2	<.1
52K	20	B900E	150	5.1	4.7	99	53	86	.15	1.08	6.0	10	8.5	66.6	4953	50.1	49.0	27.8	1.8	5.7	.01	33.9	<.1
52K	20	B900E	133	5.6	4.9	46	59	90	.11	1.05	8.5	15	8.4	63.5	4087	52.8	51.2	20.3	2.6	5.2	.08	31.0	<.1
52K	20	B900E	158	5.6	4.6	45	81	91	.09	1.04	10.6	21	7.9	67.2	4649	52.2	51.1	23.7	2.2	5.6	.04	32.1	<.1
52K	20	B900E	70	6.2	6.2	201	38	81	.22	1.14	4.2	6	59.7	57.7	1549	22.1	20.3	17.0	1.3	2.5	.25	14.2	.2
52K	20	L500E+ 600N	162	4.2	3.2	89	97	87	.14	1.02	6.6	14	9.6	71.1	3947	46.3	44.3	35.6	1.3	4.9	.08	37.8	.2
52K	20	L500E+ 600N	210	3.9	3.7	239	59	88	.13	1.05	7.4	9	6.5	69.0	5154	49.4	47.2	32.9	1.5	5.0	.04	37.5	<.1
52K	20	L500E+ 600N	174	4.9	4.4	41	58	82	.19	1.09	4.7	7	7.6	65.1	4646	49.6	47.8	29.2	1.7	4.8	.04	36.3	<.1
52K	20	L500E+ 600N	177	5.5	4.7	47	55	84	.18	1.10	5.2	9	7.5	64.3	4548	54.4	53.6	30.2	1.8	5.5	.12	30.6	<.1
52K	20	L500E+ 600N	133	5.5	4.5	36	63	89	.11	1.06	8.3	13	6.4	68.5	4667	52.4	52.0	18.7	2.8	5.2	.04	33.2	<.1
52K	20	L500E+ 600N	173	6.1	5.4	73	53	89	.12	1.05	7.7	14	14.7	63.3	4523	50.2	49.3	17.5	2.9	5.1	.23	27.0	.3
52K	20	L500E+ 600N	77	6.5	6.3	116	35	76			3.2		54.4			26.6	22.0	17.7	1.5	2.9	.45	14.1	.3

HG PPM	CA PPM	P PPM	K PPM	AL PPM	FE PPM	PB PPM	MN PPM	MG PPM	CU PMM	ZN PMM	TOP INT (CM)	BOT INT (CM)	HUM 1-9	PEAT TYPE				REL POS	VEGETATION COVER					FOR	SUB	SUR WAT PH	AV D-W CM
														S	C	L	X		T %	TS %	LS %	G %	SP %				
.08	6200	720	1800	4700	14500	4	65	1030	<1	34	0	50	3	0	10	0	0	1	2	0	7	60	40	3	3	5.0	5
.03	20400	710	600	4300	4800	<2	30	1690	<1	4	50	150	4	0	10	0	0	1	2	0	7	60	40	3	3	5.0	5
.03	27700	520	500	3200	3800	2	30	2250	1	4	150	250	4	0	9	1	0	2	2	0	7	60	40	3	3	5.0	5
<.03	35400	270	900	5500	2500	<2	40	2660	3	2	250	300	5	8	0	2	0	3	2	0	7	60	40	3	3	5.0	5
.06	30600	320	1100	6600	2200	<2	65	2390	11	4	300	360	6	8	0	2	0	3	2	0	7	60	40	3	3	5.0	5
<.03	22300	210	1400	5700	4100	<2	50	1830	2	8	360	450	4	4	5	1	0	4	2	0	7	60	40	3	3	5.0	5
.03	13100	170	1400	5700	3600	<2	35	1140	2	8	450	480	5	6	4	0	0	4	2	0	7	60	40	3	3	5.0	5
.08	2900	450	1600	3800	2600	10	60	750	3	28	0	60	1	9	1	0	0	0	1	0	18	9	99	1	3	4.0	22
<.03	5200	510	400	2400	1800	<2	20	430	1	4	60	150	3	5	4	1	0	1	1	0	18	9	99	1	3	4.0	22
<.03	13000	390	500	3000	2100	<2	10	580	4	2	150	210	4	4	5	1	0	2	1	0	18	9	99	1	3	4.0	22
.05	6500	590	200	4500	1800	<2	10	580	1	4	210	300	6	3	5	2	0	3	1	0	18	9	99	1	3	4.0	22
<.03	40500	290	1200	5300	11100	<2	65	1240	4	30	300	370	6	6	0	4	0	4	1	0	18	9	99	1	3	4.0	22
.05	4200	710	2400	2900	3300	2	40	1050	1	22	0	20	2	9	0	1	0	1	26	0	21	6	88	1	4		72
.04	4700	940	1900	6600	4700	<2	30	1070	<1	16	20	40	4	7	1	2	0	1	26	0	21	6	88	1	4		72
.04	4600	590	700	4600	2100	<2	15	680	6	6	40	60	5	2	5	3	0	1	26	0	21	6	88	1	4		72
<.03	22800	330	600	4800	3300	<2	20	790	10	4	60	100	5	0	5	5	0	1	26	0	21	6	88	1	4		72
<.03	17600	570	800	6700	3900	2	30	1330	7	2	100	190	5	0	4	6	0	2	26	0	21	6	88	1	4		72
.07	30700	410	1300	8600	7900	7	75	2140	2	4	190	330	6	0	4	6	0	4	26	0	21	6	88	1	4		72
.03	11900	780	2400	3300	3600	7	505	1990	3	30	0	20	1	9	0	1	0	0	15	3	20	4	98	2	3	5.1	28
<.03	20200	500	800	4200	2900	<2	110	2000	<1	8	20	60	3	7	0	3	0	1	15	3	20	4	98	2	3	5.1	28
<.03	24300	370	500	2700	2400	<2	35	1570	4	4	60	150	5	0	2	8	0	2	15	3	20	4	98	2	3	5.1	28
.07	32900	250	500	3300	5200	<2	40	1770	<1	2	150	230	6	4	3	3	0	3	15	3	20	4	98	2	3	5.1	28
<.03	32600	280	900	4700	6500	<2	60	1850	8	4	230	350	2	4	2	2	0	4	15	3	20	4	98	2	3	5.1	28
<.03	30900	440	10200	43600	16200	<2	230	4800	<1	26	350	380						5	15	3	20	4	98	2	3	5.1	28
<.03	1900	490	1300	2100	1400	8	50	660	5	30	0	50	3	8	2	0	0	1	7	0	30	5	99	1	3	3.7	42
<.03	2300	280	300	1800	700	<2	5	380	12	6	50	200	4	6	4	0	0	2	7	0	30	5	99	1	3	3.7	42
<.03	6500	410	600	4500	2200	<2	10	500	6	4	200	240	5	6	4	0	0	2	7	0	30	5	99	1	3	3.7	42
<.03	15700	310	600	4300	7200	2	15	910	5	4	240	360	6	2	6	2	0	3	7	0	30	5	99	1	3	3.7	42
<.03	26800	290	1500	9000	17200	<2	40	1690	4	6	360	400	8	8	2	0	0	4	7	0	30	5	99	1	3	3.7	42
<.03	2000	820	2500	2800	3500	10	100	780	12	34	0	20	2	8	1	1	0	1	10	0	25	5	98	1	5	3.5	43
<.03	2500	450	400	2200	600	<2	10	310	13	8	20	70	3	6	3	1	0	1	10	0	25	5	98	1	5	3.5	43
<.03	5400	330	300	1700	500	<2	5	420	9	4	70	120	4	3	6	1	0	2	10	0	25	5	98	1	5	3.5	43
<.03	11900	390	500	3000	1000	<2	15	620	7	4	120	180	5	4	6	0	0	2	10	0	25	5	98	1	5	3.5	43
.03	20900	330	1100	5000	2400	<2	40	1020	4	6	180	210	5	2	4	4	0	3	10	0	25	5	98	1	5	3.5	43
.05	23300	460	1100	4800	3500	4	70	1230	3	10	210	300	4	6	2	2	0	3	10	0	25	5	98	1	5	3.5	43
<.03	23300	260	800	3400	3700	<2	70	1160	2	6	300	340	6	5	4	1	0	4	10	0	25	5	98	1	5	3.5	43
<.03	26200	610	14000	50900	25900	<2	345	13740	18	56	340	400						5	10	0	25	5	98	1	5	3.5	43
.05	5500	1000	2200	4600	4100	2	50	1530	6	16	0	20	3	8	1	1	0	1	45	0	5	10	95	4	5	4.0	53
<.03	9500	410	700	3300	1400	<2	35	1340	3	14	20	80	4	3	2	5	0	1	45	0	5	10	95	4	5	4.0	53
.03	18200	320	800	4400	1900	<2	50	2130	4	24	80	110	3	2	0	8	0	2	45	0	5	10	95	4	5	4.0	53
.04	22000	350	700	3800	2400	<2	55	2090	3	24	110	170	5	4	0	6	0	2	45	0	5	10	95	4	5	4.0	53
<.03	20500	420	600	2300	3300	<2	65	1820	2	8	170	210	5	1	4	5	0	3	45	0	5	10	95	4	5	4.0	53
<.03	21700	505	2700	9560	7500	<2	120	3105	4	14	210	330	5	2	5	3	0	4	45	0	5	10	95	4	5	4.0	53
.06	25800	660	13600	46400	26100	<2	375	13610	646	62	330	350						5	45	0	5	10	95	4	5	4.0	53

APPENDIX B.3 PHYSICAL AND CHEMICAL CHARACTERISTICS OF PEAT SAMPLES FROM SIOUX LOOKOUT AREA. (Refer to Section 3.5 for sources and context of data.)

NTS	PEAT LAND NO.	SAMPLE POINT LOCATION	CAT EX CAP	H2o PH	CACL2 PH	COND	FIB %	MC % WET	DRY BULK DENS	WET BULK DENS	VAL ABSO	CAP ABSO	ASH %	VOL %	NET CAL /G	C TTL %	C ORG %	C:N	N %	H %	S %	O %	AS PPM
52J	191	B000E	289	4.1	3.1	30	99	92	.08	.96	11.7	27.4	3.1	81.8	4248	47.8	46.9	95.6	0.5	4.8	.07	43.7	<.1
52J	191	B000E	178	4.6	3.7	15	81	96	.04	1.00	21.7	37.3	3.7	76.7	4574	47.7	46.6	47.7	1.0	4.8	.03	42.8	<.1
52J	191	B000E	154	5.1	4.0	24	65	95	.05	1.02	18.6	27.0	12.3	65.5	4319	47.8	47.0	26.6	1.8	4.4	.07	33.6	<.1
52J	191	B000E	152	5.5	4.9	35	43	93	.08	1.04	12.3	17.2	27.9	52.4	3764	40.8	39.2	25.5	1.6	4.2	.14	25.4	<.1
52J	191	B000E	144	7.1	6.9	54	33	92	.09	1.04	10.9	12.6	32.0	46.4	3674	37.7	36.9	19.8	1.9	4.1	.21	24.1	.4
52J	191	B400E	19	4.3	3.4	63	99	94	.06	.98	15.4	35.8	4.9	73.8	4158	44.4	43.8	74.0	0.6	4.9	.07	45.1	.2
52J	191	B400E	23	4.8	3.9	23	81	91	.09	1.04	10.4	21.2	5.8	69.2	4733	53.9	53.0	27.0	2.0	5.6	.02	32.7	<.1
52J	191	B400E	37	5.4	4.7	50	45	87	.14	1.07	6.8	9.9	7.5	62.4	4702	52.1	51.4	23.7	2.2	5.5	.14	32.6	<.1
52J	191	L700E+200S	25	5.2	4.9	46	99	92	.08	.98	11.8	27.1	4.3	74.6	4178	45.8	43.6	76.3	0.6	4.5	.03	44.8	<.1
52J	191	L700E+200S	22	4.5	3.6	18	53	90	.10	1.05	9.1	17.3	4.6	69.3	5179	56.2	55.4	29.6	1.9	5.9	.06	31.3	<.1
52J	191	L700E+200S	39	4.7	4.1	25	31	85	.16	1.06	5.7	8.9	8.7	63.8	5080	54.1	53.8	41.6	1.3	5.7	.14	30.1	.1
52J	191	L700E+200S	32	5.0	4.3	35	41	86	.15	1.07	6.2	8.9	10.9	59.4	4843	50.7	49.6	26.7	1.9	5.1	.19	31.2	<.1
52J	190	L1400N+300E	11	4.6	3.3	58	100	94	.06	.99	15.9	30.9	5.6	76.8	4059	47.0	46.2	58.8	0.8	4.8	.08	41.7	<.1
52J	190	L1400N+300E	343	4.5	3.2	28	99	95	.05	1.02	18.2	38.5	5.5	74.7	4147	47.1	46.4	58.9	0.8	4.8	.01	41.8	.4
52J	190	L1400N+300E	26	4.7	3.5	20	76	92	.08	1.04	12.0	20.8	4.6	72.1	4638	51.0	50.0	28.3	1.8	5.2	.04	37.4	<.1
52J	190	L1400N+300E	39	5.2	4.3	22	54	91	.09	1.03	9.9	18.6	9.8	65.2	4649	56.1	55.0	31.2	1.8	6.1	.07	26.1	<.1
52J	190	L300N+100E	238	5.2	4.3	52	70	91	.09	1.02	10.5	20.3	16.9	68.8	3850	44.5	43.6	22.3	2.0	5.0	.10	31.5	<.1
52J	190	L300N+100E	286	4.4	3.7	19	60	91	.09	1.05	10.1	16.8	6.1	70.8	4815	54.2	53.0	30.1	1.8	5.3	.05	32.5	<.1
52J	190	L300N+100E	184	4.3	3.4	11	43	87	.13	1.05	6.8	10.7	4.1	69.7	4996	54.6	53.8	36.4	1.5	5.3	.02	34.5	<.1
52J	190	L300N+100E	280	4.6	3.7	25	55	90	.10	1.05	9.3	14.4	4.2	68.4	4970	53.4	53.0	26.7	2.0	5.6	.04	34.8	<.1
52J	190	L300N+100E	195	5.2	4.3	35	71	92	.08	1.04	12.0	23.6	5.1	67.3	4147	51.1	50.4	25.6	2.0	5.0	.15	36.6	<.1
52J	190	L300N+100E	193	6.1	5.0	41	68	91	.09	1.04	10.2	17.8	6.8	71.9	4809	52.6	51.6	23.9	2.2	5.5	.09	32.8	<.1
52J	190	L300N+100E	139	6.4	5.7	63	79	89	.12	1.07	8.3	10.8	28.8	57.7	3522	35.6	34.8	12.3	2.9	4.2	.24	28.3	<.1
52J	190	L900N+100E	323	4.5	3.4	34	90	95	.05	1.02	17.9	26.9	4.4	78.1	4138	44.9	43.6	49.9	0.9	4.8	.06	44.9	.2
52J	190	L900N+100E	246	4.4	3.5	34	88	94	.06	1.00	15.4	22.7	5.1	74.5	4460	50.0	49.2	25.0	2.0	5.2	.04	37.7	<.1
52J	190	L900N+100E	211	5.3	4.1	32	54	90	.10	1.04	9.2	15.2	5.4	68.7	4889	50.2	49.0	23.9	2.1	5.2	.06	37.0	<.1
52J	190	L900N+100E	242	5.6	4.8	35	60	89	.12	1.05	7.9	13.9	7.0	67.7	4729	45.4	44.0	25.2	1.8	5.1	.08	40.6	<.1
52J	187	B700N	271	4.2	3.3	223	83	88	.11	.94	7.3	23.1	2.8	76.1	4369	49.7	48.0	82.8	0.6	4.8	.09	42.0	<.1
52J	187	B700N	371	5.1	3.3	27	70	92	.08	1.04	12.0	23.2	4.6	75.9	4664	51.0	50.1	25.5	2.0	5.3	.07	37.0	<.1
52J	187	B700N	420	4.7	3.5	17	74	93	.07	1.02	13.7	20.8	4.3	72.0	4779	49.5	48.8	38.1	1.3	4.6	.09	40.2	.2
52J	187	B700N	312	4.9	4.0	25	62	91	.09	1.03	10.5	15.1	5.1	69.9	5060	49.8	49.0	49.8	1.0	4.4	.01	39.7	<.1
52J	187	B700N	226	5.1	4.2	26	51	92	.08	1.02	11.2	18.9	5.4	67.1	4774	49.2	48.4	28.9	1.7	5.1	.08	38.5	<.1
52J	187	B700N	216	5.5	5.0	32	62	91	.09	1.01	10.6	20.2	8.1	72.1	4735	48.0	47.2	40.0	1.2	5.1	.11	37.5	<.1
52J	187	B700N	156	5.6	5.0	56	71	90	.10	1.04	9.4	9.3	29.4	57.9	3697	37.4	36.2	22.0	1.7	4.5	.20	26.8	<.1
52J	187	B1000N	238	3.9	3.0	103	97	90	.10	.97	8.5	22.2	2.3	76.9	4422	45.8	44.0	91.6	0.5	4.3	.01	47.1	<.1
52J	187	B1000N	240	4.3	3.2	18	76	89	.11	1.04	8.3	12.9	6.6	69.3	4890	50.6	49.6	25.3	2.0	5.1	.09	35.6	<.1
52J	187	B1000N	166	4.6	3.2	28	62	89	.12	1.04	7.9	13.0	4.5	69.4	4915	49.1	48.8	30.7	1.6	4.9	.01	39.9	<.1
52J	187	B1000N	148	4.3	3.4	13	50	87	.14	1.04	6.4	11.0	4.3	68.6	4913	55.0	54.0	36.7	1.5	6.0	.02	33.2	<.1
52J	187	B1000N	228	4.5	3.7	20	49	88	.12	1.05	7.4	14.1	5.7	68.3	5070	55.0	54.0	36.7	1.5	6.0	.02	31.8	<.1
52J	187	B1000N	200	5.0	4.0	28	49	89	.12	1.05	7.8	13.9	7.7	63.2	4722	47.1	46.8	29.4	1.6	4.8	.24	38.6	<.1
52J	187	B1000N	212	5.2	4.3	33	64	89	.11	1.05	8.3	14.8	11.1	63.0	4524	50.2	49.0	25.1	2.0	5.5	.09	31.1	<.1
52J	187	B100N	224	4.2	3.0	23	99		.10	.96	8.8	25.0	2.5	76.7	4670	48.4	47.4	96.8	0.5	4.3	.03	44.3	.2
52J	187	B100N	316	3.8	2.9	<10	62	90	.10	1.06	9.3	16.3	4.1	72.7	4457	52.0	51.0	47.3	1.1	5.4	.07	37.3	<.1
52J	187	B100N	332	4.3	3.4	22	53	90	.10	1.04	9.1	13.9	4.8	69.4	5156	51.7	51.0	25.9	2.0	5.3	.01	36.2	<.1
52J	187	B100N	246	5.1	4.2	33	53	88	.12	1.05	7.6	11.5	8.3	65.4	4865	52.6	51.8	29.2	1.8	5.5	.06	31.7	<.1
52J	185	B900E	293	3.9	2.9	<10	82	93	.07	1.02	12.7	25.3	4.7	82.1	4212	48.1	47.0	60.1	0.8	4.1	.34	42.0	<.1
52J	185	B900E	217	3.7	2.9	<10	46	86	.14	1.04	6.2	11.2	3.8	72.6	4778	52.7	51.6	37.6	1.4	5.8	.12	36.2	.1
52J	185	B900E	206	4.7	3.6	29	58	90	.11	1.06	8.6	16.2	3.3	69.3	4941	52.1	51.6	40.1	1.3	5.1	.11	38.1	<.1
52J	185	B900E	229	4.8	4.0	43	59	89	.12	1.07	8.2	12.4	4.1	64.9	4667	55.6	54.6	37.1	1.5	5.5	.02	33.3	<.1
52J	185	B900E	240	4.8	4.2	47	53	86			6.3		6.3		4311	53.0	51.6	31.2	1.7	5.5	.21	33.3	<.1
52J	185	L700E+200N	260	3.9	2.8	67	93	90	.09	.92	9.1	26.8	1.8	77.4	3982	45.9	45.4	114	0.4	5.6	.04	46.3	<.1
52J	185	L700E+200N	283	3.7	2.9	<10	73	90	.10	1.02	8.9	19.6	3.2	75.1	4332	49.9	49.3	62.4	0.8	5.5	.01	40.6	<.1
52J	185	L700E+200N	345	4.0	3.1	<10	87	94	.06	1.02	15.7	31.9	2.2	74.8	4328	48.7	48.0	81.2	0.6	5.0	.03	43.5	<.1
52J	185	L700E+200N	172	4.3	3.7	14	60	89	.11	1.03	8.3	14.0	4.0	71.5	4787	53.0	52.2	20.4	2.6	5.4	.02	35.0	.1
52J	185	L700E+200N	273	5.0	4.1	38	52	90	.11	1.05	8.8	14.2	6.2	70.6	4549	51.6	51.2	25.8	2.0	5.3	.10	34.8	<.1
52J	185	L700E+200N	248	5.3	4.7	55	37	86	.15	1.06	6.1	9.5	11.5	59.8	4258	52.0	50.8	20.0	2.6	5.3	.20	28.4	<.1
52J	185	B100E	234	4.0	2.9	119	100	88	.11	.92	7.6	21.0	1.6	78.1	3977	49.3	47.4	123	0.4	4.9	.04	43.8	<.1
52J	185	B100E	286	4.2	3.2	22	69	91	.10	1.04	9.5	17.0	4.5	72.0	4487	51.2	50.2	36.6	1.4	5.2	.02	37.7	<.1
52J	185	B100E	362	4.0	3.2	<10	78	93	.07	1.04	13.5	32.0	3.0	73.8	4449	51.6	51.2	57.3	0.9	5.3	.01	39.2	<.1
52J	185	B100E	243	4.3	3.4	13	63	90	.10	1.04	9.3	14.3	4.9	69.4	4822	52.4	52.0	21.8	2.4	5.6	.03	34.7	<.1
52J	185	B100E	119	4.9	4.1	24	62	90	.11	1.04	8.8	16.3	5.4	69.9	4886	51.0	50.6	18.9	2.7	5.4	.05	35.4	<.1
52J	185	B100E	159	4.9	4.1	32	71	90	.11	1.05	8.7	16.0	7.0	66.0	4758	51.2	50.8	21.3	2.4	5.4	.14	33.9	<.1
52J	185	B100E	146	5.0	4.2	44	54	86	.15	1.06	6.0	10.4	8.2	63.3	4776	54.3	54.0	23.6	2.3	5.7	.09	29.4	<.1
52J	168	B100W	119	3.9	3.5	45	100	87	.12	.99	6.9	15.6	1.4	77.5	4322	49.4	49.0	98.8	0.5	5.0	.07	43.6	<.1
52J	168	B100W	191	4.4	3.6	17	72	91			10.6		6.2	76.3	4518	48.9	48.2	34.9	1.4	5.1	.01	38.4	<.1
52J	168	B100W	140	5.0	4.4	27	47	88	.13	1.08	7.5	11.5	6.3	66.2	4640	51.8	51.2	25.9	2.0	5.3	.31	34.3	<.1
52J	168	B100W	150	4.7	4.0	17	52	89	.12	1.07	7.8	12.0	6.3	66.0	4549	51.9	51.2	28.8	1.8	5.7	.09	34.2	<.1
52J	168	B100W	171	6.1	5.4	55	40	88	.13	1.07	7.3	11.0	10.2	61.2	4083	50.8	50.6	21.2	2.4	5.3	.21	31.1	<.1
52J	168	B100W	131	6.3	5.8	67	35	84	.18	1.10	5.1	7.9	40.9	44.6	2901	32.6	32.0	19.2	1.7	3.9	.33	20.6	.2
52J	168	B100W						45			.8		87.3	15.0		5.7	5.4	19.0	0.3	.8	.14	5.8	<.1
52J	168	B1000W	177	4.1	3.2	81	96	89	.11	.93	7.8	22.6	1.9	78.4	4405	45.2	44.8	90.4	0.5	4.7	.06	47.6	.1
52J	168	B1000W	211	4.0	3.1	<10	80	93	.07	1.04	13.1	24.1	3.7	74.0	4206	46.5	46.1	42.3	1.1	5.1	.01	43.6	.6
52J	168	B1000W	171	4.	3.1	<10	64	91	.10	1.05	9.9	17.3	3.0	73.2	4458	52.8	52.7	40.6	1.3	5.5	.03	37.4	.3
52J	168	B1000W	253	4.7	3.7	36	48	90	.10	1.06	9.4	14.3	4.8	68.8	4795	49.2	48.9	28.9	1.7	5.3	.02	39.0	.2
52J	168	B1000W	182	5.4	4.6	57	52	90	.10	1.07	9.2	14.5	6.8	66.9	4638	47.6	47.4	28.0	1.7	4.5	.11	39.3	<.1
52J	168	B700W	191	4.2	3.2	16	99	94	.06	1.00	16.9	37.1	3.5	78.1	4095	44.1	43.8	63.0	0.7	4.2	.07	47.4	.3
52J	168	B700W	108	4.2	3.3	11	50	89	.11	1.07	8.4	12.4	4.3	70.8	4213	53.4	53.1	29.7	1.8	5.6	.01	34.9	<.1
52J	168	B700W	113	4.5	3.8	18	47	89	.11	1.06	8.3	12.5	4.6	68.7	5207	54.4	54.0	34.0	1.6	5.5	.14	33.8	.2
52J	168	B700W	135	5.2	4.4	33	65	91	.10	1.06	9.5	15.4	6.0	65.8	4769	50.9	50.4	26.8	1.9	5.8	.06	35.3	<.1
52J	168	B700W	187	5.6	5.0	40	52	89	.11	1.05	8.3	12.5	7.8	63.6	4508	51.6	51.3	25.8	2.0	5.5	.26	32.8	.8
52J	168	B700W						85			5.8		30.7		3890								<.1

HG PPM	CA PPM	P PPM	K PPM	AL PPM	FE PPM	PB PPM	MN PPM	MG PPM	CU PMM	ZN PMM	TOP INT (CM)	BOT INT (CM)	HUM 1-9	PEAT TYPE				REL POS	VEGETATION COVER					FOR	SUB	SUR WAT PH	AV D-W CM
														S	C	L	X		T %	TS %	LS %	G %	SP %				
<.03	8600	480	600	3200	1800	8	30	1020	4	20	0	30	3	10	0	0	0	1	0	0	22	40	95	1		4.5	19
.06	700	60	100	400	200	<2	5	70	3	<2	30	200	3	10	0	0	0	2	0	0	22	40	95	1		4.5	19
<.03	8800	480	600	4700	2100	<2	50	490	11	10	200	300	4	9	1	0	0	4	0	0	22	40	95	1		4.5	19
<.03	9800	620	500	6500	2800	<2	75	570	22	18	300	400						5	0	0	22	40	95	1		4.5	19
<.03	30100	2880	14500	9700	20900	<2	1630	6300	24	32	400	700		0	0	0	10	5	0	0	22	40	95	1		4.5	19
.04	5600	470	300	3000	1500	6	25	290	5	<2	0	30	3	10	0	0	0	1	17	0	12	30	95	1	1	4.7	24
<.03	8500	370	200	3100	1700	<2	25	410	11	<2	30	160	4	8	1	1	0	3	17	0	12	30	95	1	1	4.7	24
<.03	20600	560	2400	2300	4000	<2	295	1490	19	68	160	180	6	8	0	2	0	4	17	0	12	30	95	1	1	4.7	24
<.03	900	<40	<100	1100	4300	2	85	7450	8	2	0	30	3	10	0	0	0	1	22	0	20	40	95	1	3	4.5	22
<.03	4800	520	400	3800	1300	2	10	300	7	<2	30	170	4	10	0	0	0	2	22	0	20	40	95	1	3	4.5	22
.03	9100	380	700	8900	2300	2	10	580	14	<2	170	220	6	10	0	0	0	4	22	0	20	40	95	1	3	4.5	22
<.03	10100	440	1000	11900	3000	6	20	810	18	<2	220	250		8	2	0	0	4	22	0	20	40	95	1	3	4.5	22
<.03	2100	510	2300	1700	1700	20	85	850	4	36	0	10	2	10	0	0	0	1	8	0	22	7	95	1	3	3.5	7
.04	2200	430	1000	2600	1500	14	30	700	1	18	10	30	3	10	0	0	0	1	8	0	22	7	95	1	3	3.5	7
.06	3500	580	400	3700	3000	4	25	410	7	2	30	170	4	9	1	0	0	2	8	0	22	7	95	1	3	3.5	7
<.03	5800	900	700	9500	9600	8	95	680	9	<2	170	240	5	7	1	2	0	4	8	0	22	7	95	1	3	3.5	7
<.03	4800	520	1400	4200	2800	20	40	960	3	20	0	10	3	9	1	0	0	1	0	0	7	6	95	1	4	4.3	19
.05	3700	570	500	4300	1400	6	10	510	2	<2	10	100	4	9	1	0	0	1	0	0	7	6	95	1	4	4.3	19
<.03	3300	420	300	3700	1100	2	5	410	5	<2	100	200	4	8	2	0	0	2	0	0	7	6	95	1	4	4.3	19
<.03	5200	410	200	4800	1300	2	5	380	7	<2	200	300	5	8	2	0	0	2	0	0	7	6	95	1	4	4.3	19
<.03	9400	310	300	4200	2000	2	15	430	4	<2	300	400	4	9	0	1	0	3	0	0	7	6	95	1	4	4.3	19
<.03	9800	280	600	4800	2800	4	25	550	2	4	400	440	4	1	9	0	0	4	0	0	7	6	95	1	4	4.3	19
<.03	13100	440	3200	16300	8000	6	80	2400	6	54	440	590						5	0	0	7	6	95	1	4	4.3	19
<.03	4500	550	900	1700	2000	24	65	1040	5	20	0	10	2	9	0	1	0	1	3	0	27	35	95	1	1	4.5	7
<.03	4400	640	900	3000	1800	14	30	800	3	10	10	20	3	9	0	1	0	1	3	0	27	35	95	1	1	4.5	7
.03	7700	660	300	5000	2200	4	15	630	9	<2	20	200	4	8	1	1	0	2	3	0	27	35	95	1	1	4.5	7
<.03	14200	640	300	6800	4100	4	25	1020	14	<2	200	240	5	8	0	1	0	4	3	0	27	35	95	1	1	4.5	7
<.03	3600	560	3000	1000	600	8	510	680	3	20	0	30	3	10	0	0	0	1	5	0	7	30	90	1	3	4.2	15
<.03	2800	450	300	4000	1100	4	10	420	3	<2	30	200	4	9	1	0	0	3	5	0	7	30	90	1	3	4.2	15
.06	3000	370	300	3900	1100	6	5	400	1	8	200	270	4	9	1	0	0	3	5	0	7	30	90	1	3	4.2	15
<.03	6800	410	300	5300	2300	4	10	560	4	2	270	300	5	8	1	1	0	3	5	0	7	30	90	1	3	4.2	15
<.03	8300	360	500	5200	2800	4	15	830	3	8	300	380	4	8	2	0	0	3	5	0	7	30	90	1	3	4.2	15
.03	6700	340	900	6000	2800	4	25	1010	2	8	380	400	4	0	10	0	0	4	5	0	7	30	90	1	3	4.2	15
<.03	8000	470	3400	16900	6000	6	55	2310	6	56	400	450						5	5	0	7	30	90	1	3	4.2	15
<.03	2200	340	1900	1000	600	8	325	640	3	22	0	30	3	9	0	1	0	1	5	0	57	4	95	1	3	4.2	38
<.03	1700	770	600	4600	800	4	10	300	1	6	30	60	3	9	0	1	0	1	5	0	57	4	95	1	3	4.2	38
.06	2000	560	400	4100	800	2	5	250	2	4	60	150	4	7	2	0	0	2	5	0	57	4	95	1	3	4.2	38
.04	3200	450	500	4600	900	2	5	290	3	6	150	200	6	6	4	0	0	2	5	0	57	4	95	1	3	4.2	38
<.03	5500	360	600	5600	1600	2	5	410	1	20	200	250	4	6	4	0	0	3	5	0	57	4	95	1	3	4.2	38
<.03	10000	320	800	7300	3200	4	10	650	3	6	250	300	5	7	3	0	0	3	5	0	57	4	95	1	3	4.2	38
<.03	10600	310	1700	9100	4600	2	20	960	5	6	300	370	3	2	8	0	0	4	5	0	57	4	95	1	3	4.2	38
.07	2100	320	2500	900	500	2	415	650	1	20	0	30	2	9	0	1	0	1	0	0	63	30	65	1	3	4.4	18
.06	2200	340	400	2700	800	4	10	270	1	10	30	140	4	9	1	0	0	2	0	0	63	30	65	1	3	4.4	18
.03	3600	470	500	4500	1500	4	10	280	1	6	140	200	4	8	2	0	0	3	0	0	63	30	65	1	3	4.4	18
<.03	10700	340	900	6800	4500	4	15	760	2	4	200	300	4	7	2	1	0	4	0	0	63	30	65	1	3	4.4	18
.07	1200	530	900	2400	1200	14	40	460	1	24	0	30	3	9	1	0	0	1	28	0	55	14	80	1	4	4.4	44
<.03	1600	500	300	2800	600	2	5	200	2	6	30	140	4	9	1	0	0	2	28	0	55	14	80	1	4	4.4	44
<.03	4600	320	300	3100	700	2	5	240	1	4	140	200	4	8	1	1	0	3	28	0	55	14	80	1	4	4.4	44
.09	13900	230	200	2200	1200	<2	5	440	2	4	200	280	3	2	8	0	0	4	28	0	55	14	80	1	4	4.4	44
<.03	24200	220	300	3200	2100	2	10	770	3	6	280	300	7	2	7	1	0	4	28	0	55	14	80	1	4	4.4	44
<.03	1700	360	2000	900	600	6	215	510	2	20	0	30	3	10	0	0	0	1	39	0	45	7	92	1	4	4.3	48
<.03	1900	310	300	2200	700	2	10	280	<1	8	30	110	4	9	1	0	0	1	39	0	45	7	92	1	4	4.3	48
<.03	2400	230	200	1700	600	12	15	280	1	4	110	160	3	9	1	0	0	2	39	0	45	7	92	1	4	4.3	48
.03	2400	310	600	3100	500	2	5	220	1	8	160	260	4	9	1	0	0	3	39	0	45	7	92	1	4	4.3	48
<.03	12700	300	600	4000	1500	<2	10	700	<1	4	260	330	4	6	4	0	0	4	39	0	45	7	92	1	4	4.3	48
<.03	23700	320	1500	7800	3200	<2	40	1700	<1	4	330	380	6	9	1	0	0	4	39	0	45	7	92	1	4	4.3	48
.04	1200	350	1300	900	500	8	110	460	11	14	0	30	3	10	0	0	0	1	2	0	22	5	95	1	3	4.2	48
.03	3100	500	400	3000	700	4	10	390	1	8	30	110	4	8	2	0	0	1	2	0	22	5	95	1	3	4.2	48
<.03	3400	260	200	2000	700	50	15	420	4	4	110	190	3	9	1	0	0	2	2	0	22	5	95	1	3	4.2	48
<.03	2600	330	800	4800	800	2	10	320	1	10	190	200	3	0	10	0	0	3	2	0	22	5	95	1	3	4.2	48
<.03	3300	320	900	4700	800	2	10	320	1	10	200	300	4	0	10	0	0	3	2	0	22	5	95	1	3	4.2	48
<.03	7300	370	700	4700	1300	<2	10	430	2	10	300	330	5	4	6	0	0	4	2	0	22	5	95	1	3	4.2	48
<.03	11100	330	1100	6100	1900	2	20	640	3	10	330	340	7	4	6	0	0	4	2	0	22	5	95	1	3	4.2	48
.03	1700	320	1700	600	500	6	215	630	4	34	0	30	2	9	1	0	0	1	0	0	0	65	85	2	4	5.0	-4
<.03	5400	500	900	4400	1600	4	50	620	<1	2	30	160	3	7	1	2	0	2	0	0	0	65	85	2	4	5.0	-4
.04	12000	400	600	5300	2500	<2	35	920	3	2	160	190	3	8	1	1	0	3	0	0	0	65	85	2	4	5.0	-4
<.03	8900	400	800	5800	2200	<2	35	820	3	2	190	250	4	8	2	0	0	3	0	0	0	65	85	2	4	5.0	-4
<.03	22100	400	1100	6100	4000	<2	65	1180	12	<2	250	330	5	8	2	0	0	4	0	0	0	65	85	2	4	5.0	-4
<.03	23400	420	6300	27000	9800	<2	145	3940	9	60	330	410	7					5	0	0	0	65	85	2	4	5.0	-4
<.03	60700	530	14500	54400	18000	<2	350	18440	<1	42	410	440						6	0	0	0	65	85	2	4	5.0	-4
.04	2100	440	2200	1200	700	10	455	530	4	12	0	10	3	9	1	0	0	1	5	0	7	37	90	1	1	4.0	16
<.03	3300	460	400	2400	1100	6	15	470	1	<2	10	60	3	9	1	0	0	1	5	0	7	37	90	1	1	4.0	16
<.03	3100	400	400	2400	1000	2	5	330	1	<2	60	170	4	8	2	0	0	2	5	0	7	37	90	1	1	4.0	16
<.03	5900	470	500	5500	1600	<2	10	310	4	<2	170	250	4	9	0	1	0	3	5	0	7	37	90	1	1	4.0	16
<.03	14900	470	600	6200	4600	2	35	590	9	<2	250	340	5	8	1	1	0	4	5	0	7	37	90	1	1	4.0	16
<.03	2400	550	1500	1500	1700	12	70	650	1	26	0	40	3	8	2	0	0	1	1	0	15	62	90	1	4	4.0	9
<.03	2900	560	500	3400	1100	2	5	250	2	<2	40	130	4	8	2	0	0	2	1	0	15	62	90	1	4	4.0	9
<.03	5700	420	500	4900	1600	<2	5	350	4	<2	130	210	4	8	2	0	0	3	1	0	15	62	90	1	4	4.0	9
<.03	9600	410	700	5600	2900	4	15	590	7	<2	210	260	5	8	2	0	0	3	1	0	15	62	90	1	4	4.0	9
.05	18200	320	700	5300	6100	2	35	930	17	<2	260	320	5	7	1	2	0	4	1	0	15	62	90	1	4	4.0	9
.06											320	330						5	1	0	15	62	90	1	4	4.0	9

APPENDIX B.3 SIOUX LOOKOUT AREA (CONTINUED).

NTS	PEAT LAND NO.	SAMPLE POINT LOCATION	CAT EX CAP	H2O PH	CACL2 PH	COND	FIB %	MC % WET	DRY BULK DENS	WET BULK DENS	VAL ABSO	CAP ABSO	ASH %	VOL %	NET CAL /G	C TTL %	C ORG %	C:N	N %	H %	S %	O %	AS PPM
52J	125	B500E	178	6.4	6.1	66	70	89	.11	1.05	8.3	14.6	8.9	70.5	3942	47.5	47.0	26.4	1.8	4.5	.06	37.2	.6
52J	125	B500E	116	5.9	5.4	22	66	90	.11	1.05	8.5	15.6	7.5	68.1	4447	51.6	51.0	21.5	2.4	5.7	.12	32.7	<.1
52J	125	B500E	138	6.1	5.5	32	60	91	.10	1.05	9.8	15.8	7.1	65.8	4491	53.6	53.2	21.4	2.5	6.1	.10	30.6	.1
52J	125	B500E	177	6.4	5.8	57	42	88	.13	1.07	7.3	11.0	10.5	63.5	4586	46.2	46.1	17.1	2.7	4.8	.37	35.4	.3
52J	125	B200E	192	4.3	3.6	61	99	91	.09	.95	9.8	24.4	3.5	81.6	3818	45.0	44.4	56.3	0.8	4.8	.03	45.9	.6
52J	125	B200E	205	5.8	5.1	24	72	91	.10	1.06	9.6	15.6	6.1	69.0	4729	49.4	48.8	24.7	2.0	5.1	.11	37.3	.5
52J	125	B200E	243	5.8	5.3	34	61	90	.11	1.05	9.0	14.4	7.3	66.1	4280	48.2	48.0	25.4	1.9	4.8	.21	37.6	.3
52J	125	B200E	273	6.2	5.6	35	70	91	.09	1.06	10.2	19.2	7.5	68.4	4003	48.7	48.2	27.1	1.8	4.8	.17	37.0	.5
52J	125	B200E	243	6.5	5.9	51	52	87	.14	1.07	6.6	9.3	10.5	65.6	4480	48.0	47.6	24.0	2.0	5.1	.35	34.0	.7
52J	125	B200E	188	6.5	5.9	51	42	86	.15	1.07	5.9	9.0	11.8	63.2	4055	48.4	47.6	22.0	2.2	4.8	.31	32.5	.4
52J	125	B200E																					
52J	125	L700E+100N	165	6.7	5.7	110	86	91	.09	1.04	10.0	14.3	11.0	68.4	3985	47.2	47.1	22.5	2.1	4.9	.11	34.7	2.5
52J	125	L700E+100N	176	5.9	5.5	19	62	91	.09	1.06	10.2	15.3	6.3	68.3	4667	51.8	51.4	21.6	2.4	5.5	.14	33.9	.6
52J	125	L700E+100N	210	5.9	5.4	29	52	89	.12	1.06	8.2	12.1	9.5	62.8	4146	51.0	50.8	30.0	1.7	5.5	.07	32.2	<.1
52J	125	L700E+100N	248	6.6	6.3	32	65	91	.10	1.07	9.5	16.2	11.2	62.4	4647	48.1	47.8	37.0	1.3	4.6	.21	34.6	.3
52J	125	L700E+100N						88			7.1		40.0		4311	47.1	46.6	26.2	1.8		.32		<.1
52J	113	B200N	169	4.3	3.2	65	95	87	.12	.98	6.9	15.7	3.4	74.3	4352	47.0	46.8	67.1	0.7	5.1	.07	43.7	<.1
52J	113	B200N	224	5.9	5.2	37	56	88	.13	1.10	7.3	9.4	8.3	61.2	4171	50.1	49.6	35.8	1.4	5.0	.06	35.1	<.1
52J	113	B200N	216	5.8	6.2	43	49	84	.17	1.08	5.3	9.1	8.8	63.4	4028	49.4	49.0	38.0	1.3	4.8	.14	35.6	<.1
52J	113	B200N	201	5.8	5.2	39	58	88	.13	1.09	7.3	11.8	10.0	60.9	3935	50.1	49.4	45.5	1.1	5.3	.11	33.4	<.1
52J	113	B200N	194	6.0	5.3	49	45	86	.15	1.08	6.4	9.8	9.6	60.6	4136	51.4	50.5	30.2	1.7	5.3	.20	31.8	.9
52J	113	B200N	173	6.1	6.0	54	58	88	.13	1.08	7.3	12.0	7.7			52.7	51.9	25.1	2.1	5.7	.39	31.4	<.1
52J	113	B200N	196	6.2	5.5	43	71	90	.11	1.04	8.8	19.6	7.7			49.0	48.1	20.4	2.4	4.9	.54	35.5	<.1
52J	113	B200N	207	6.0	5.5	48	65	89	.11	1.05	8.3	15.8	8.7	65.7	4168	51.6	50.4	30.4	1.7	5.4	.51	32.1	1.0
52J	113	L700N+300W	140	5.4	4.6	51	79	89	.11	1.06	8.3	13.5	7.7	69.9	4295	51.5	50.7	34.3	1.5	5.5	.20	33.6	<.1
52J	113	L700N+300W	161	5.2	4.4	27	56	89	.12	1.07	8.0	12.4	5.2	65.2	4701	54.9	54.0	32.3	1.7	6.1	.09	32.0	.3
52J	113	L700N+300W	192	5.5	4.8	32	63	87	.14	1.06	6.7	10.6	5.4	64.0	4567	55.2	54.3	39.4	1.4	6.3	.07	31.6	.5
52J	113	L700N+300W	190	5.7	4.9	39	57	87	.14	1.07	6.8	11.9	6.7	63.7	4597	55.6	54.7	29.3	1.9	6.3	.06	29.4	.2
52J	113	L700N+300W	178	5.7	5.0	32	69	88	.12	1.05	7.6	13.6	9.7	62.7	4495	51.4	51.0	24.5	2.1	5.1	.06	31.6	.6
52J	29	B1000N	240	4.1	2.7	72	88	90	.10	.98	9.2	27.1	1.2	77.8	4248	52.1	50.9	130	0.4	5.3	.03	41.0	.3
52J	29	B1000N	238	3.9	2.9	<10	73	93	.08	1.04	12.3	25.5	2.1	78.3	4430	50.5	49.8	84.2	0.6	5.2	.19	41.4	<.1
52J	29	B1000N	279	4.0	2.9	<10	74	94	.07	1.04	14.6	30.1	1.8	74.7	4609	52.0	51.4	52.0	1.0	5.8	.05	39.3	<.1
52J	29	B1000N	174	4.5	3.6	13	71	91	.09	1.06	10.6	18.7	3.7	75.2	4887	54.0	53.4	27.0	2.0	5.5	.01	34.8	<.1
52J	29	B1000N	235	5.4	4.4	30	87	93	.08	1.04	12.7	23.8	4.0	72.2	4756	54.6	54.0	26.0	2.1	5.8	.08	33.4	<.1
52J	29	B1000N	224	5.5	4.4	52	45	90	.11	1.08	9.1	15.9	6.7	67.7	4742	53.1	52.6	21.2	2.5	6.1	.20	31.4	<.1
52J	29	B1000N	203	5.7	4.8	54	43	90	.11	1.05	8.8	12.7	12.9	63.2	4488	46.4	46.2	20.2	2.3	4.5	.32	33.6	<.1
52J	29	L1900N+400E	177	5.0	4.5	74	78	89	.11	1.03	8.2	16.7	5.9	76.3	4239	49.9	47.4	55.4	0.9	5.0	.04	38.3	.2
52J	29	L1900N+400E	190	5.9	5.1	24	46	90	.11	1.07	8.5	12.2	6.5	69.7	4599	53.2	53.0	20.5	2.6	5.4	.13	32.2	<.1
52J	29	L1900N+400E	151	6.2	5.6	33	56	89	.12	1.07	8.2	13.0	7.8	67.5	4649	54.9	54.5	21.1	2.6	6.1	.04	28.6	<.1
52J	29	L1900N+400E	253	6.3	5.6	29	70	92	.08	1.05	11.7	20.3	6.1	67.0	4650	51.4	50.9	25.7	2.0	5.4	.11	35.0	<.1
52J	29	L1900N+400E	108	6.4	5.8	37	55	90	.11	1.07	9.1	13.0	10.7	63.7	4530	54.6	53.8	20.2	2.7	6.0	.21	25.8	<.1
52J	29	L1900N+400E	147	6.4	5.9	42	59	90	.10	1.04	9.3	15.8	10.8	63.6	4371	51.9	51.1	23.6	2.2	5.4	.20	29.5	<.1
52J	29	L1900N+400E						61	.03	.08	1.6		69.7	24.2		13.6	13.4	27.2	0.5	.4	.78	15.0	.7
52J	29	B400N	138	4.8	3.8	40	70	90	.11	1.08	9.2	14.0	5.5	73.5	4508	48.7	48.1	28.6	1.7	5.1	.06	38.9	<.1
52J	29	B400N	132	6.2	5.5	30	52	89	.12	1.07	7.8	14.5	6.1	67.7	4701	54.2	54.0	24.6	2.2	6.0	.02	31.5	<.1
52J	29	B400N	175	6.2	5.7	43	57	88	.13	1.07	7.5	10.5	10.1	63.1	4394	50.7	50.2	39.0	1.3	5.4	.01	32.5	.1

HG PPM	CA PPM	P PPM	K PPM	AL PPM	FE PPM	PB PPM	MN PPM	MG PPM	CU PMM	ZN PMM	TOP INT (CM)	BOT INT (CM)	HUM 1-9	PEAT TYPE S	C	L	X	REL POS	VEGETATION COVER T %	TS %	LS %	G %	SP %	FOR	SUB	SUR WAT PH	AV D-W CM
.09	26500	900	1400	3200	9900	10	420	1670	<1	10	0	40	3	8	1	1	0	1	14	0	30	17	80	3	1	5.6	2.8
<.03	21500	370	400	2100	2700	<2	110	1040	<1	<2	40	200	3	8	2	0	0	3	14	0	30	17	80	3	1	5.6	2.8
<.03	23600	270	500	2900	3200	<2	80	1160	<1	<2	200	390	4	8	2	0	0	3	14	0	30	17	80	3	1	5.6	2.8
<.03	26300	320	1200	5100	5800	<2	100	1530	5	4	390	420	6	9	1	0	0	4	14	0	30	17	80	3	1	5.6	2.8
<.03	7900	470	1700	1200	800	4	235	950	2	22	0	10	2	9	1	0	0	1	35	0	60	15	85	3	3	5.3	33
<.03	22800	470	400	2300	2800	2	80	1040	<1	<2	10	30	3	9	0	1	0	1	35	0	60	15	85	3	3	5.3	33
<.03	31800	370	400	2500	4800	<2	130	1120	<1	<2	30	100	4	8	1	1	0	1	35	0	60	15	85	3	3	5.3	33
<.03	35100	260	300	2500	5400	<2	135	1330	<1	<2	100	190	4	10	0	0	0	2	35	0	60	15	85	3	3	5.3	33
.04	37600	350	700	3600	9900	<2	135	1550	<1	<2	190	310	4	8	1	1	0	3	35	0	60	15	85	3	3	5.3	33
<.03	37500	370	900	4200	11000	<2	135	1640	6	<2	310	440	5	9	0	1	0	4	35	0	60	15	85	3	3	5.3	33
											440	500	6	9	0	1	0	4	35	0	60	15	85	3	3	5.3	33
<.03	22400	820	2200	3100	18700	16	1980	1460	<1	38	0	40	4	9	0	1	0	1	7	0	25	45	90	3	3	5.7	34
.03	22500	460	400	2400	7100	2	215	1000	<1	<2	40	200	4	9	0	1	0	2	7	0	25	45	90	3	3	5.7	34
<.03	32500	330	700	4700	6100	<2	240	1250	<1	<2	200	280	4	8	1	1	0	3	7	0	25	45	90	3	3	5.7	34
<.03	40300	220	700	4800	6800	4	230	1390	<1	<2	280	370	5	8	0	2	0	4	7	0	25	45	90	3	3	5.7	34
<.03											370	390						5	7	0	25	45	90	3	3	5.7	34
<.03	5808	360	1439	986	700	12	80	1108	1	28	0	40	4	9	0	1	0	1	19	15	37	15	80	3	3	5.5	35
<.03	36200	410	500	3100	2200	<2	165	2470	2	<2	40	100	4	9	0	1	0	1	19	15	37	15	80	3	3	5.5	35
<.03	37400	240	300	3400	1700	6	105	2250	<1	<2	100	170	5	8	0	2	0	2	19	15	37	15	80	3	3	5.5	35
<.03	37600	190	300	2800	1300	<2	80	2290	2	2	170	220	4	9	0	1	0	2	19	15	37	15	80	3	3	5.5	35
<.03	42200	290	700	4200	1700	<2	95	2340	3	6	220	300	4	8	0	2	0	3	19	15	37	15	80	3	3	5.5	35
<.03	29400	280	500	3200	1600	<2	70	1710	8	22	300	330	5	9	1	0	0	4	19	15	37	15	80	3	3	5.5	35
<.03	27600	210	600	2900	2200	2	55	1580	22	46	330	380	4	9	1	0	0	4	19	15	37	15	80	3	3	5.5	35
.04	31700	200	600	3200	4200	<2	75	1810	12	22	380	390	3	9	0	1	0	4	19	15	37	15	80	3	3	5.5	35
.05	14200	698	1264	3136	2200	18	30	2130	<1	26	0	30	3	9	1	0	0	1	9	0	65	40	95	1	3	4.4	15
<.03	15100	400	400	3100	1100	<2	10	1290	<1	4	30	140	4	9	0	1	0	2	9	0	65	40	95	1	3	4.4	15
<.03	22300	230	400	3600	1600	2	10	1400	<1	4	140	170	4	8	0	2	0	3	9	0	65	40	95	1	3	4.4	15
<.03	21600	230	500	4300	1800	<2	15	1380	<1	2	170	210	4	6	4	0	0	3	9	0	65	40	95	1	3	4.4	15
.03	19000	330	1500	6800	2600	<2	20	1470	<1	6	210	260	4	8	2	0	0	4	9	0	65	40	95	1	3	4.4	15
.03	1500	340	1600	700	400	8	300	470	<1	22	0	40	3	10	0	0	0	1	2	0	50	1	99	1	3	4.4	46
<.03	2000	300	300	1600	600	2	10	320	1	8	40	140	3	8	2	0	0	1	2	0	50	1	99	1	3	4.4	46
.06	2800	280	300	1600	600	<2	10	300	1	14	140	250	4	8	2	0	0	2	2	0	50	1	99	1	3	4.4	46
<.03	3500	310	700	3100	700	<2	5	330	<1	8	250	350	4	7	3	0	0	3	2	0	50	1	99	1	3	4.4	46
<.03	8600	250	600	3100	1500	<2	10	530	<1	8	350	390	3	9	1	0	0	3	2	0	50	1	99	1	3	4.4	46
<.03	15000	310	900	5000	2300	2	10	830	<1	6	390	430	4	8	2	0	0	4	2	0	50	1	99	1	3	4.4	46
.04	16300	400	2400	8700	4300	<2	25	1320	6	14	430	540	4	9	1	0	0	4	2	0	50	1	99	1	3	4.4	46
<.03	16500	720	2200	1100	6400	6	2455	1810	<1	38	0	20	3	8	2	0	0	1	81	20	10	50	90	4	3	5.5	31
<.03	22600	770	500	2300	6300	2	160	1310	<1	2	20	110	3	8	2	0	0	1	81	20	10	50	90	4	3	5.5	31
<.03	26700	530	600	3300	6400	<2	110	1100	<1	4	110	260	4	8	2	0	0	2	81	20	10	50	90	4	3	5.5	31
<.03	23700	250	400	2500	5900	<2	90	1070	<1	4	260	320	3	9	1	0	0	3	81	20	10	50	90	4	3	5.5	31
.04	26700	360	1200	5900	6600	<2	110	1350	3	6	320	340	4	9	1	0	0	3	81	20	10	50	90	4	3	5.5	31
<.03	25200	250	1300	5000	7600	<2	105	1500	3	6	340	470	3	10	0	0	0	4	81	20	10	50	90	4	3	5.5	31
<.03	163600	330	9300	30000	18300	<2	250	14550	<1	16	470	490						6	81	20	10	50	90	4	3	5.5	31
<.03	6900	780	1000	2700	3300	14	65	1030	<1	30	0	30	3	7	2	1	0	1	35	5	40	4	80	1	3	4.2	34
.03	22400	500	500	3000	2400	<2	60	1710	<1	6	30	200	4	7	2	1	0	2	35	5	40	4	80	1	3	4.2	34
.12	27300	210	600	3600	3100	<2	50	1550	<1	4	200	250	5	7	2	1	0	4	35	5	40	4	80	1	3	4.2	34

APPENDIX B.4 PHYSICAL AND CHEMICAL CHARACTERISTICS OF PEAT SAMPLES FROM IGNACE AREA. (Refer to Section 3.5 for sources and context of data.)

NTS	PEAT LAND NO.	SAMPLE POINT LOCATION	CAT EX CAP	H2O PH	CACL2 PH	COND	FIB %	MC % WET	DRY BULK DENS	WET BULK DENS	VAL ABSO	CAP ABSO	ASH %	VOL %	NET CAL /G	C TTL %	C ORG %	C:N	N %	H %	S %	O %	AS PPM
52G	119	L400E+ 100S	98	5.9	4.9	112	70	90	.10	1.10	9.1	16	21.1	63.4	3652	42.2	35.2	20.1	2.1	4.6	.19	29.8	<.1
52G	119	L400E+ 100S	81	4.8	4.1	34	46	88	.12	1.00	7.1	12	8.7	69.0	4601	52.2	50.8	21.8	2.4	5.5	.22	31.0	<.1
52G	119	L400E+ 100S	89	4.9	4.0	32	43	90	.11	1.09	8.6	13	8.2	69.0	4686	51.8	50.4	17.9	2.9	5.5	.19	31.4	<.1
52G	119	L400E+ 100S	92	4.8	4.1	34	28	87	.14	1.09	6.4	12	9.6	67.0		52.5	51.6	19.4	2.7	5.9	.24	29.1	<.1
52G	119	L400E+ 100S	71	4.9	4.2	34	23	87	.14	1.09	6.7	12	11.8	64.7	4799	52.6	51.0	21.0	2.5	5.7	.14	27.3	<.1
52G	119	L400E+ 100S	73	4.8	4.3	46	20	85	.15	.99	5.6	11	16.4	60.2	4577	49.7	43.5	20.7	2.4	4.9	.25	26.3	.7
52G	119	G700E+500N	134	4.0	3.3	22	74	94	.07	1.05	15.1	27	4.4	76.8	4364	47.1	44.8	36.2	1.3	4.6	.09	42.7	.4
52G	119	G700E+ 500N	185	3.5	3.0		45	91	.09	1.01	10.1	17	2.8	74.2	4980	52.8	51.9	40.6	1.3	5.2	.06	37.8	<.1
52G	119	G700E+ 500N	132	3.7	3.0		52	91	.09	1.04	10.4	17	2.3	74.0	4912	52.3	52.0	43.6	1.2	5.3	.06	38.8	<.1
52G	119	G700E+ 500N	138	4.3	3.4	25	43	90	.10	1.07	8.8	15	4.7	70.3	5131	55.0	54.1	20.4	2.7	5.9	.11	31.6	<.1
52G	119	G700E+ 500N	73	4.7	3.8	64	23	87	.13	1.07	6.7	14	11.8	64.1	4892	53.3	53.1	20.5	2.6	5.3	.17	26.8	<.1
52G	152	B1700W	100	4.6	3.6	58	77	92	.09	1.15	11.8	24	10.0	73.0	4248	45.4	40.4	26.7	1.7	4.4	.13	38.4	.1
52G	152	B1700W	110	4.3	3.3	25	46	88	.12	1.03	7.6	13	7.5	71.0	4925	53.6	53.2	23.3	2.3	5.3	.16	31.2	<.1
52G	152	B1700W	73	4.7	3.8	31	42	88	.11	.99	7.3	12	7.1	70.2	4989	54.0	53.8	24.5	2.2	6.0	.42	30.3	<.1
52G	152	B1700W	67	5.0	4.3	43	27	88	.15	1.07	6.0	10	16.2	62.3	4576	47.5	46.1	18.3	2.6	4.6	.27	28.8	<.1
52G	152	B1700W	59	5.1	4.5	69	18	83	.18	1.09	4.9	8	25.5	55.3	3998	41.3	36.0	18.0	2.3	4.1	.56	26.2	<.1
52G	152	B1700W	62	4.8	4.4	110	32	84	.18	1.15	5.4	9	28.8	52.4	3782	39.8	22.4	19.0	2.1	3.4	.57	25.3	<.1
52G	152	B1700W	47	4.3	4.2	271	17	77	.25	1.12	3.4	5	62.6	30.6	1791	20.7	11.0	15.9	1.3	3.0	.49	11.9	.4
52G	152	B1000W	166	4.3	3.2	48	84	93	.08	1.13	12.6	27	5.2	78.1	4239	45.3	41.9	56.6	.8	4.7	.05	43.9	<.1
52G	152	B1000W	140	4.0	3.1	29	49	90	.10	1.04	9.1	15	5.4	76.4	4711	51.5	50.9			5.3	.10		<.1
52G	152	B1000W	151	4.0	3.1	18	49	90	.10	1.05	8.7	15	3.9	72.2	4967	53.1	53.0	27.9	1.9	5.8	.11	35.2	<.1
52G	152	B1000W	78	4.0	3.4	17	35	88	.13	1.08	7.3	12	5.0	70.0	4953	52.9	51.8	24.0	2.2	5.7	.17	34.0	<.1
52G	152	B1000W	69	4.3	3.7	26	35	87	.13	1.01	6.5	11	10.9	65.4	4763	50.2	49.8	26.4	1.9	5.2	.25	31.5	.2
52G	152	B1000W	60	4.5	3.9	22	23	85	.15	1.04	5.7	8	22.7	58.2	4115	44.4	40.0	17.8	2.5	4.6	.22	25.6	<.1
52G	155	B700W	122	4.0	3.1	43	112	93	.07	1.00	13.3	28	2.7	80.2	4135	44.6	40.1	49.6	.9	4.9	.06	46.8	<.1
52G	155	B700W	136	3.9	3.1	20	53	91	.09	1.03	9.9	15	4.9	73.9	4560	49.3	45.8			5.3	.13		<.1
52G	155	B700W	126	4.0	3.2	17	51	89	.10	1.00	8.4	12	3.7	73.5	4905	54.4	54.2	23.7	2.3	5.6	.17	33.8	<.1
52G	155	B700W	119	4.1	3.4	11	48	89	.11	1.01	7.7	15	3.9	71.5	5119	55.8	55.2	22.3	2.5	5.9	.22	31.7	<.1
52G	155	B700W	67	4.4	3.5	25	42	87	.13	1.06	6.6	12	6.9	67.7	5046	54.5	53.7	24.8	2.2	5.9	.20	30.3	.1
52G	155	B700W	69	4.4	3.5	26	58	88	.11	1.02	7.5	10	8.7	32.3	4872	51.5	50.9			5.3	.22		1.6
52G	155	L500W+ 200S	114	3.9	2.7	14	87	94	.06	1.15	16.1	30		72.9	4309	45.5	40.6			5.3	.08		.1
52G	155	L500W+ 200S	110	4.1	2.9	29	76	93	.07	1.07	13.6	25	6.5	75.5	4420	47.9	45.3			5.3	.10		<.1
52G	155	L500W+ 200S	116	4.1	3.4	29	48	89	.11	1.03	8.0	13	4.0	72.6	4953	54.4	52.0	28.8	1.9	5.7	1.00	34.0	.1
52G	155	L500W+ 200S	173	4.2	3.2	22	67	92	.09	1.12	11.2	23	4.6	77.9	5033	55.2	54.6	25.1	2.2	6.0	.07	31.9	<.1
52G	155	L500W+ 200S	99	4.4	3.3	27	47	89	.11	1.02	7.8	11	8.0	68.9	4824	53.3	53.0	26.7	2.0	5.4	.13	31.2	<.1
52G	155	L500W+ 200S	4		3.7			74	.30	1.18	2.9	10	54.0	37.0	2244	28.8	17.2			4.8	.10		<.1
52G	155	L500W+ 200S	11		3.8			35			.5		92.7	8.6		5.0	3.3	25.1	.2	3.9	.05	0.0	.1
52G	155	T7	120	5.7	4.2	118	75	92	.08	1.06	11.3	21	8.9	72.9	4174	46.5	42.0	29.1	1.6	5.3	.13	37.6	1.1
52G	155	T7	104	4.3	3.8	30	49	90	.09	1.00	9.3	12	8.6	69.4	4914	52.8	52.5	21.1	2.5	5.6	.20	30.3	.2
52G	155	T7	68	4.8	3.8	33	36	84	.17	1.09	5.4	10	7.2	69.8	5094	55.5	55.1	24.1	2.3	5.9	.17	28.9	<.1
52G	155	T7	97	4.8	3.9	37	41	88	.12	1.03	7.5	14	9.0	68.1	5201	54.4	53.9	20.1	2.7	5.1	.20	28.6	<.1
52G	155	T7	92	4.9	3.9	37	34	89	.11	1.00	7.9	13	9.1	69.1	5115	55.7	54.9	20.6	2.7	5.3	.20	27.0	<.1
52G	155	T7			4.1			59			1.5		76.9	19.3		14.0	8.2	28.0	.5	3.8	.07	4.7	<.1
52G	163	B600W	135	4.3	3.5	43	96	94	.06	1.11	16.8	28	4.1	79.3	4084	45.3	42.4	47.8	6.0	4.2	.07	45.4	.8
52G	163	B600W	102	4.1	3.2	19	40	89	.11	1.03	7.9	12	6.7	71.9	4923	52.4	50.7	22.8	2.3	5.6	.18	32.8	.2
52G	163	B600W	88	4.1	3.3	14	36	86	.14	1.05	6.3	11	5.7	72.8	5159	53.3	52.3	23.2	2.3	5.6	.17	32.9	.2
52G	163	B600W	97	4.2	3.5	20	39	86	.14	1.07	6.3	11	7.7	69.5	5085	53.5	53.0	22.3	2.4	5.8	.73	29.9	.2
52G	163	B600W	66	4.4	3.8	63	18	81	.20	1.07	4.3	8	30.3	50.5	3726	41.4	33.2	21.8	1.9	4.1	.40	21.9	.6
52G	163	L000+300S	181	3.8	3.5	13	58	92	.08	1.00	10.9	19	3.9	77.2	4502	44.8	41.4	29.9	1.5	4.5	.08	45.2	.6
52G	163	L000+300S	124	3.8	2.9	27	46	90	.10	.99	8.9	15	5.7	71.6	4828	51.1	49.9	28.4	1.8	5.1	.12	36.2	<.1
52G	163	L000+300S	111	3.8	3.0	11	48	89	.12	1.06	7.7	14	3.8	72.0	5146	54.3	53.8	30.2	1.8	5.6	.23	34.3	.1
52G	163	L000+300S	100	3.9	3.2	5	38	87	.12	1.00	6.8	15	4.3	70.4	5328	55.8	54.7	31.0	1.8	5.2	.13	32.8	<.1
52G	163	L000+300S	103	4.0	3.3	13	26	87	.13	1.02	6.5	17	7.6	68.7	5204	54.2	54.0	28.5	1.9	5.2	.17	31.0	<.1
52G	163	L000+300S	104	4.5	3.6	76	27	81	.19	1.03	4.4	8	10.6	62.5	5100	55.4	54.9	29.2	1.9	5.7	.27	26.1	.2
52G	163	L000+300S	89	4.5	3.8	32	25	84	.18	1.11	5.1	9	19.7	59.2	4604	48.2	45.1			5.2	.20		.4
52G	165	L1700N+670W	141	4.1	3.1	20	102	94	.05	.99	16.9	41	2.4	80.0	4160	45.6	40.6	65.1	.7	5.7	.14	45.5	1.0
52G	165	L1700N+670W	87	3.6	3.1		64	93	.07	1.05	12.5	21	7.1	72.7	4469	48.8	45.3			5.3	.15		.2
52G	165	L1700N+670W	108	4.1	3.2	26	55	92	.07	1.01	11.8	16	7.2	71.8	4666	50.0	48.7			5.3	:09		<.1
52G	165	L1700N+670W	129	4.2	3.2	29	53	92	.07	.99	11.8	18	4.8	72.3	4798	52.1	50.5	30.6	1.7	5.3	.10	36.0	<.1
52G	165	L1700N+670W	123	4.1	3.4	18	55	92	.07	1.00	12.2	22	3.4		5030	52.4	50.0			4.9	.07		<.1
52G	165	L1700N+670W	101	4.1	3.3	14	63	91	.08	.98	10.6	16	2.9	72.2	4866	54.6	51.9	42.0	1.3	5.4	.10	35.7	<.1
52G	165	L1700N+670W	84	4.4	3.6	26	54	90	.10	1.04	9.1	13	4.4	70.7	5148	54.8	53.7	78.3	.7	5.9	.15	34.0	<.1
52G	165	L1700N+670W	88	4.5	3.8	26	50	89	.11	1.03	8.1	15	13.1	63.7	4747	51.2	50.0			4.8	.14		.1
52G	165	L1700N+670W			4.2			39			.6		79.9	15.8		12.4	8.0	124	.1	3.8	.02	3.8	.2
52G	165	L200N+700W	160	4.6	3.3	76	90	91	.10	1.15	9.8	33	5.7	77.3	4034	46.2	38.6	57.8	.8	4.1	.06	43.1	.5
52G	165	L200N+700W	92	4.9	4.1	32	64	92	.07	.98	11.4	20	9.1	71.4	4571	50.3	50.0			5.3	.17		.2
52G	165	L200N+700W	105	5.1	4.6	29	57	91	.11	1.25	10.2	17	7.7	71.5	4781	52.5	51.7	18.1	2.9	5.7	.18	31.0	.1
52G	165	L200N+700W	79	5.4	4.8	39	54	90	.11	1.11	8.6	14	7.0	71.0	4749	53.8	52.9	19.9	2.7	5.5	.16	30.8	<.1
52G	165	L200N+700W	81	5.6	5.0	37	52	90	.11	1.13	8.7	14											<.1
52G	165	L200N+700W	102	5.8	5.2	34	52	89	.11	.98	7.8	11	9.2	67.3	4566	52.7	50.4	26.4	2.0	5.4	.17	30.5	.2
52G	165	L200N+700W	137	5.5	5.0	33	57	88	.12	1.08	7.4	11	12.5	63.5	4118	49.0	45.3	35.0	1.4	5.1	.20	31.8	<.1
52G	165	L200N+700W		4.8	4.6	136	34	80			4.0		52.8	37.3	2216	26.8	13.1			3.6	.35	16.5	1.4
52G	181	B1800W	153	4.1	3.0	65	89	91	.10	1.11	9.8	29	3.1	81.7	4312	48.2	40.7	53.6	.9	4.6	.05	43.2	<.1
52G	181	B1800W	114	3.7	3.0		64	91	.10	1.09	9.8	17	4.1	75.7	4595	50.6	47.1	38.9	1.3	5.1	.11	38.8	<.1
52G	181	B1800W	126	4.0	3.1	23	58	90	.11	1.11	8.5	17	2.9	72.9	5069	54.0	50.8	31.8	1.7	5.6	.12	35.7	<.1
52G	181	B1800W	100	4.1	3.4	26	42	88	.11	1.00	7.5	14	3.6	55.8	5173	56.5	54.9	24.6	2.3	5.9	.14	31.6	<.1
52G	181	B1800W	57	4.5	3.8	36	26	82	.18	1.02	4.4	8	37.3	47.4	3474	35.8	24.3	23.9	1.5	4.2	.13	21.1	.9
52G	181	L400W+200S	88	4.4	3.1	55		88	.12	.99	7.1	9	3.5	77.0	4116	45.2	40.1	50.2	.9	4.1	.09	46.2	1.8
52G	181	L400W+200S	72	4.7	3.9	23	47	91	.08	.99	10.1	17	6.7	71.6	4985	52.8	51.7	19.6	2.7	5.5	.14	32.2	.2
52G	181	L400W+200S	77	5.0	4.2	31	84	88	.12	1.01	7.4	13	7.7	71.9	4967	53.7	53.0	21.5	2.5	6.0	.15	29.9	.2
52G	181	L400W+200S	50	5.1	4.6	47	29	84	.16	1.02	5.2	11	17.1	59.7	4392	48.8	44.6	13.6	3.6	4.8	.32	25.4	.2
52G	181	L400W+200S	86	5.0	4.7	101	13	79	.23	1.09	3.7	7	28.2	52.8	3993	42.4	37.9	19.3	2.2	4.1	.42	22.7	.2

											TOP	BOT		PEAT TYPE					VEGETATION COVER							SUR	AV
HG PPM	CA PPM	P PPM	K PPM	AL PPM	FE PPM	PB PPM	MN PPM	MG PPM	CU PMM	ZN PMM	INT (CM)	INT (CM)	HUM 1-9	S	C	L	X	REL POS	T %	TS %	LS %	G %	SP %	FOR	SUB	WAT PH	D-W CM
.12	5642	995	1531	2803	19152	35	145	1315	6	62	0	20	2	10	0	0	0	0	2	3	8	39	99	3	3	5.4	12
.05	5396	797	634	4013	6728	3	56	1076	6	22	20	70	3	6	3	1	0	1	2	3	8	39	99	3	3	5.4	12
.03	4481	637	260	4014	6809	<2	41	808	6	20	70	120	3	2	8	0	0	3	2	3	8	39	99	3	3	5.4	12
.04	4935	735	828	5697	8465	<2	50	1061	12	14	120	150	4	2	7	1	0	3	2	3	8	39	99	3	3	5.4	12
.05	4733	828	1285	7549	10264	40	57	1220	24	24	150	175	6	1	9	1	0	4	2	3	8	39	99	3	3	5.4	12
.05	5004	842	1467	8844	11629	13	64	1355	50	44	175	200	5	1	9	1	0	4	2	3	8	39	99	3	3	5.4	12
.11	1817	540	1064	1924	1202	11	74	568	4	61	0	55	2	10	0	0	0	1	8	0	17	13	99	1	3	5.0	39
.04	1485	460	321	1882	789	3	11	257	3	39	55	135	4	9	1	0	0	2	8	0	17	13	99	1	3	5.0	39
.03	1832	332	281	1738	1163	<2	6	243	3	14	135	220	3	10	0	0	0	2	8	0	17	13	99	1	3	5.0	39
.02	1935	350	800	3186	2332	3	7	270	3	9	220	325	3	10	0	0	0	3	8	0	17	13	99	1	3	5.0	39
.02	4951	446	2347	7553	7450	7	25	797	9	26	325	365	4	7	3	0	0	4	8	0	17	13	99	1	3	5.0	39
.07	3513	841	1844	3440	4876	17	63	984	3	51	0	20	1	10	0	0	0	0	15	0	24	24	99	1	2		21
.05	2555	639	866	3458	5081	5	29	417	6	9	20	40	3	3	7	0	0	1	15	0	24	24	99	1	2		21
.05	2808	654	692	4496	13206	4	49	447	8	5	40	140	4	4	6	0	0	2	15	0	24	24	99	1	2		21
.06	5710	899	1567	7832	17360	19	98	787	33	7	140	190	5	7	3	0	0	4	15	0	24	24	99	1	2		21
.03	5440	547	1607	5735	8288	9	93	679	43	11	190	230						5	15	0	24	24	99	1	2		21
.18	8377	500	3349	12038	16226	10	136	1868	48	32	230	250						5	15	0	24	24	99	1	2		21
.38	13022	479	7852	21058	12450	11	207	4500	57	74	250	280						6	15	0	24	24	99	1	2		21
.07	2149	648	1260	2158	1960	21	47	722	4	70	0	25	1	10	0	0	0	0	9	1	19	13	99	1	4	4.9	12
.06	1938	922	780	2135	1600	12	11	368	7	14	25	40	3	6	4	0	0	1	9	1	19	13	99	1	4	4.9	12
.02	1378	532	446	2119	2352	19	6	225	6	3	40	110	3	3	7	0	0	2	9	1	19	13	99	1	4	4.9	12
.03	1038	678	568	5175	3600	7	9	261	13	10	110	140	4	3	7	0	0	3	9	1	19	13	99	1	4	4.9	12
.04	669	987	672	9694	6247	6	13	328	18	29	140	170	4	2	8	0	0	4	9	1	19	13	99	1	4	4.9	12
.04	1054	1092	1169	12541	11573	15	25	670	34	15	170	180	5	3	7	0	0	4	9	1	19	13	99	1	4	4.9	12
.05	1450	542	1291	1065	1727	18	49	660	3	46	0	35	2	10	0	0	0	0	25	0	21	13	99	1	4		36
.05	1775	715	630	1902	1719	7	17	336	4	32	35	50	3	10	0	0	0	1	25	0	21	13	99	1	4		36
.04	1575	558	489	2443	2429	5	8	194	3	11	50	100	3	6	4	0	0	1	25	0	21	13	99	1	4		36
.02	2202	475	616	2905	7268	4	12	252	3	13	100	160	3	6	3	1	0	3	25	0	21	13	99	1	4		36
.01	3472	617	934	4986	11450	22	26	463	8	9	160	200	4	2	7	1	0	4	25	0	21	13	99	1	4		36
<.01	4128	645	1265	5723	8695	50	33	538	12	8	200	220	3	7	3	0	0	4	25	0	21	13	99	1	4		36
.05	3901	462	617	2276	922	8	10	1108	3	8	0	15	2	10	0	0	0	0	6	4	18	32	99	1	6		32
.03	2234	742	561	2139	1778	84	23	441	5	70	15	50	3	10	0	0	0	1	6	4	18	32	99	1	6		32
.04	2652	511	538	1328	2348	24	14	258	5	21	50	125	3	7	3	0	0	2	6	4	18	32	99	1	6		32
.04	4756	432	550	2621	5442	4	25	345	3	11	125	150	3	8	2	0	0	3	6	4	18	32	99	1	6		32
.05	6668	493	1000	4551	8576	4	45	601	5	5	150	190	3	10	0	0	0	4	6	4	18	32	99	1	6		32
.04	13020	411	9019	29361	11924	12	171	3714	8	16	190	200						5	6	4	18	32	99	1	6		32
.01	21653	452	15797	47410	19189	26	359	7113	9	27	200							6	6	4	18	32	99	1	6		32
.08	7614	1218	2399	2480	18304	21	265	1499	5	133	0	15	2	10	0	0	0	0	0	13	18	80	99	3	6	5.3	16
.08	6128	918	1187	4033	8404	11	94	803	6	17	15	100	3	3	6	1	0	2	0	13	18	80	99	3	6	5.3	16
.03	5654	664	1135	4302	7989	7	65	749	5	7	100	135	3	2	7	1	0	3	0	13	18	80	99	3	6	5.3	16
.02	5272	680	1392	5452	8838	11	71	814	6	7	135	150	4	2	8	0	0	4	0	13	18	80	99	3	6	5.3	16
.04	5559	698	1457	5734	9471	9	77	851	9	8	150	160	5	1	9	0	0	4	0	13	18	80	99	3	6	5.3	16
.02	13744	345	12826	32150	16562	16	244	5822	13	33	160	170						6	0	13	18	80	99	3	6	5.3	16
.05	5468	527	1748	1048	2228	23	29	1104	4	43	0	10	2	9	1	0	0	1	4	0	23	12	99	1	4	5.0	18
.04	2778	869	1317	3788	2961	16	16	544	7	15	20	60	3	7	3	0	0	1	4	0	23	12	99	1	4	5.0	18
.04	2899	757	867	3940	5005	9	18	458	7	14	60	90	4	7	3	0	0	2	4	0	23	12	99	1	4	5.0	18
.05	4084	672	1093	4724	10555	10	32	566	9	11	90	160	3	3	7	0	0	4	4	0	23	12	99	1	4	5.0	18
.02	6421	636	3986	14521	12348	11	70	1624	22	18	160	240						5	4	0	23	12	99	1	4	5.0	18
.05	1724	622	725	1605	1414	<2	38	473	3	21	0	40	3	9	1	0	0	1	15	10	30	5	99	1	4		23
.04	1552	782	844	2712	1115	13	10	304	5	22	40	60	4	9	1	0	0	1	15	10	30	5	99	1	4		23
.02	1522	551	386	2219	1388	7	6	215	4	10	60	100	4	8	2	0	0	2	15	10	30	5	99	1	4		23
.02	1727	509	519	3297	2137	6	7	231	6	11	100	140	3	7	3	0	0	3	15	10	30	5	99	1	4		23
.01	2017	482	876	4386	2773	9	11	334	10	10	140	150	5	7	3	0	0	3	15	10	30	5	99	1	4		23
.06	2488	1225	1042	10153	2010	12	20	481	12	7	150	190	4	3	7	0	0	4	15	10	30	5	99	1	4		23
<.01	4629	1423	4026	632	213	14	712	1393	3	85	190	200	5	3	7	0	0	4	15	10	30	5	99	1	4		23
.04	2226	488	1672	1515	2200	19	107	1036	3	40	0	15	1	9	1	0	0	0	6	0	13	10	99	1	6		16
.04	2104	700	683	2498	1687	107	12	508	8	17	15	30	3	3	6	1	0	1	6	0	13	10	99	1	6		16
.04	2092	808	656	2930	1488	6	9	423	4	12	30	60	3	6	3	1	0	1	6	0	13	10	99	1	6		16
.04	2542	542	509	2353	1256	5	7	450	3	12	60	130	3	7	3	0	0	1	6	0	13	10	99	1	6		16
.04	<250	<15	<10	<50	<50	4	<2	<15	<1	<1	130	180	4	6	4	0	0	2	6	0	13	10	99	1	6		16
.03	2227	410	419	2541	1297	6	5	394	5	5	180	260	4	6	4	0	0	3	6	0	13	10	99	1	6		16
.05	2843	653	642	4536	3137	6	16	420	11	8	260	320	4	7	3	0	0	4	6	0	13	10	99	1	6		16
.08	4611	766	1711	9800	6178	6	51	1087	15	15	320	340	5	7	3	0	0	4	6	0	13	10	99	1	6		16
.02	13494	388	13870	33542	14491	8	259	5145	11	26	340	350						6	6	0	13	10	99	1	6		16
.08	4204	475	2773	1643	9333	19	304	1288	4	40	0	35	1	9	1	0	0	0	0	2	11	24	96	3	6		13
.05	3968	943	1022	3687	8548	12	59	887	4	23	35	60	3	3	6	1	0	1	0	2	11	24	96	3	6		13
.04	5603	861	744	4169	8107	4	70	947	3	8	60	70	3	3	7	0	0	1	0	2	11	24	96	3	6		13
.04	8012	774	548	4050	7810	4	81	1161	5	7	70	160	3	6	4	0	0	1	0	2	11	24	96	3	6		13
.03											160	220	3	4	6	0	0	2	0	2	11	24	96	3	6		13
.03	14517	601	1100	4958	11133	5	253	1968	6	19	220	340	4	2	7	1	0	3	0	2	11	24	96	3	6		13
.05	19518	306	1626	5402	23107	10	626	2054	6	12	340	450	4	0	8	2	0	4	0	2	11	24	96	3	6		13
.08	15172	460	7291	23324	19180	6	359	4757	20	39	450	470						5	0	2	11	24	96	3	6		13
.06	2250	565	1854	1520	2139	19	91	872	3	41	0	35	1	9	1	0	0	0	25	0	29	20	99	1	6		29
.03	1700	562	487	2257	1036	<2	11	474	1	9	35	100	3	9	1	0	0	1	25	0	29	20	99	1	6		29
.04	1609	499	184	2392	1457	<2	6	320	3	10	100	150	4	7	3	0	0	3	25	0	29	20	99	1	6		29
.03	1813	596	302	3412	2405	<2	10	352	6	11	150	185	4	2	8	0	0	4	25	0	29	20	99	1	6		29
.04	5871	912	6293	20803	6775	5	91	1999	15	14	185	200						5	25	0	29	20	99	1	6		29
.12	4929	465	1316	1296	8190	19	293	1397	3	57	0	30	1	10	0	0	0	0	0	0	14	42	97	3	5		4
.06	3112	669	785	3647	6749	3	44	568	2	14	30	100	3	7	3	0	0	1	0	0	14	42	97	3	5		4
.03	7231	559	907	4369	12307	4	51	699	7	10	100	180	4	3	7	0	0	3	0	0	14	42	97	3	5		4
.06	8113	745	1561	7970	11154	13	54	1003	31	13	180	220	4	3	7	0	0	4	0	0	14	42	97	3	5		4
.06	7349	895	2642	12581	9938	20	61	1453	61	21	220	250						5	0	0	14	42	97	3	5		4

APPENDIX B.4 IGNACE AREA (CONTINUED).

NTS	PEAT LAND NO.	SAMPLE POINT LOCATION	CAT EX CAP	H2O PH	CACL2 PH	COND	FIB %	MC % WET	DRY BULK DENS	WET BULK DENS	VAL ABSO	CAP ABSO	ASH %	VOL %	NET CAL /G	C TTL %	C ORG %	C:N	N %	H %	S %	O %	AS PPM
52G	181	G2500S+100W	98	4.7	3.9	39	79	92	.08	1.03	11.1	19	9.4	72.9	4435	46.8	40.9	17.3	2.7	4.1	.21	36.8	.3
52G	181	G2500S+100W	93	4.5	3.8	27		88	.11	.98	7.4	10	7.0	74.5	5157	53.4	52.3	19.8	2.7	5.4	.17	31.3	.1
52G	181	G2500S+100W	77	4.6	3.9	26		87	.12	.98	6.8	11	5.5	73.8	5274	54.5	54.0	17.6	3.1	6.0	.16	30.7	.3
52G	181	G2500S+100W	73	4.9	4.3	29	27	85	.15	.99	5.5	10	11.0	66.4	4829	52.3	51.8	19.4	2.7	5.7	.24	28.1	.1
52G	181	G2500S+100W	53	4.9	4.2	40	25	84	.16	1.03	5.1	8	13.1	64.0	4677	50.8	48.6	20.3	2.5	4.8	.25	28.5	.3
52G	181	G2500S+100W	101	4.8	4.8	62	43	88	.13	1.04	7.1	12	6.9	66.1	4794	53.3	51.0	24.6	2.2	5.3	.30	31.7	.2
52G	181	G2500S+100W	78	4.8	4.3	57	66	89	.11	1.03	7.9	13	13.6	62.8	4408	48.9	46.2	18.8	2.6	4.5	.32	30.1	.4
52G	190	G500N+400W	136	4.2	3.6	129	85	92	.08	1.10	12.1	30	3.8	78.1	4107	46.7	41.3	51.9	.9	4.3	.07	44.2	.6
52G	190	G500N+400W	89	4.1	4.3	9	55	91	.08	.97	10.1	15	12.7	66.1	4443	50.4	48.5	19.4	2.6	5.2	.20	28.9	.6
52G	190	G500N+400W	89	5.1	4.4	33	44	90	.10	1.04	9.0	16	6.5	70.7	4909	52.8	51.7	15.1	3.5	5.6	.20	31.4	.1
52G	190	G500N+400W	99	5.3	4.5	47	66	92	.07	.97	11.8	18	6.9	70.1	4681	52.5	50.4	20.2	2.6	5.4	.34	32.3	.5
52G	190	G500N+400W	90	5.3	4.7	53	34	88	.12	1.01	7.4	16	12.0	64.1	4627	50.8	50.8	20.3	2.5	5.1	.29	29.3	1.0
52G	190	G500N+400W	94	5.3	4.6	56	47	90	.10	1.03	9.0	13	11.1	64.5	4641	50.3	48.6	24.0	2.1	5.1	.26	31.1	.7
52G	190	F2200N	187	4.5	3.8	57	91	95	.05	1.03	18.2	22	4.9	77.3	4060	46.2	40.1	33.0	1.4	4.3	.12	43.1	.2
52G	190	F2200N	91	4.3	3.6	36	62	92	.08	.98	11.0	18	7.5	70.6	4516	51.3	50.7	22.3	2.3	5.5	.14	33.3	<.1
52G	190	F2200N	88	4.5	3.8	28	57	91	.09	.99	9.5	13	4.4	69.5	4848	53.6	52.5	24.4	2.2	5.8	.10	33.9	<.1
52G	190	F2200N	91	4.6	3.9	32	45	90	.09	.99	9.3	16	4.4	54.7	4800	54.7	54.4	32.2	1.7	5.7	.10	33.4	.3
52G	190	F2200N	94	4.8	4.1	40	63	92	.08	1.01	11.1	16	4.3	72.9	4882	55.2	54.6			5.4	.10	35.0	.1
52G	190	F2200N	84	4.9	4.2	42	41	91	.08	.97	10.6	15	7.3	67.3	4766	55.1	53.3	27.6	2.0	6.0	.15	29.4	<.1
52G	190	F2200N	84	5.0	4.4	48	37	90	.10	1.01	9.0	15	9.9	65.5	4698	53.2	51.8	22.7	2.3	5.5	.20	29.9	<.1
52G	190	F2200N	97	5.0	4.4	54	39	87	.12	1.00	6.9	11	9.6	64.7	4575	53.3	52.9	24.2	2.2	5.6	.38	28.9	.1
52G	190	F2200N	89	4.9	4.5	54	48	90	.10	1.00	8.6	14	6.2	66.1	4712	53.5	51.7	25.5	2.1	5.8	.45	32.0	.2
52G	190	F2200N	51	4.9	4.7	127	45	83	.17	1.02	4.9	8	46.6	41.6	2518	30.2	15.8	8.2	3.7	3.7	.42	15.4	<.1
52G	190	F700N	109	4.6	3.9	61	70	90	.09	1.01	9.4	15	7.0	73.3	4368	48.2	45.1	21.6	2.4	4.5	.16	36.4	.2
52G	190	F700N	93	4.2	3.3	26	38	89	.11	.98	7.9	13	5.6	71.8	4726	53.7	52.9	22.4	2.4	5.9	.11	32.3	<.1
52G	190	F700N	85	4.3	3.2	24	62	91	.09	1.01	10.1	16	3.0	73.8	4770	54.3	54.6	30.2	1.8	5.2	.13	35.6	<.1
52G	190	F700N	78	4.4	3.5	36	41	88	.12	1.07	7.3	12	5.9	70.0	4996	56.2	55.8	24.4	2.3	6.0	.14	29.5	<.1
52G	190	F700N	104	4.8	3.8	43	45	90	.10	1.01	8.9	13	5.1	67.5	5120	54.9	51.5	22.9	2.4	5.7	.15	31.7	.1
52G	190	F700N	92	5.0	4.1	48	61	92	.08	.99	10.9	17	4.8	68.2	5006	53.8	52.2	24.5	2.2	5.8	.24	33.2	.1
52G	190	F700N	111	5.1	4.2	52	71	93	.07	1.06	13.0	23	4.5	70.4	4795	51.5	51.2	27.1	1.9	5.2	.23	36.7	.2
52G	190	F700N	96	5.1	4.2	86	54	91	.09	.97	9.5	13	7.3	64.7	4930	52.4	50.4			5.0	.56		.2
52G	190	F700N	79	5.0	4.5	128	51	87	.13	1.00	6.6	8	25.5	53.2		41.0	30.3	15.2	2.7	1.6	.35	28.9	1.0
52G	190	B200N	89	4.4	3.1	33	53	91	.09	.97	9.8	14	6.1	72.7	4797	54.2	52.1			5.6	.22	33.9	.2
52G	190	B200N	80	4.8	3.8	17	41	88	.11	1.00	7.4	11	6.8	69.9	5200	54.7	54.7			5.8	.18	32.5	.1
52G	190	B200N	64	5.0	4.0	25	32	87	.12	1.02	7.0	10	12.3	64.4	4703	55.2	54.9			5.9	.23	26.4	.3
52G	190	B200N	61	4.8	3.9	27	35	86	.13	.98	6.2	10	13.5	63.3	4693	52.4	51.6	25.0	2.1	5.3	.20	26.5	.3
52G	191A	L5200E+3000S	159	5.7	3.7	38	98	94	.06	1.02	15.2	34	9.6	74.2	3909	44.8	42.7	37.3	1.2	4.2	.15	40.0	1.4
52G	191A	L5200E+3000S	81	5.2	3.7	278	45	90	.09	.99	9.1	13	7.4	70.7	4732	51.6	49.5	14.7	3.5	4.6	.23	32.7	.4
52G	191A	L5200E+3000S	80	5.1	4.1	286	42	90	.10	1.01	8.8	13	8.3	70.8	4944	55.4	53.4	7.8	7.1	5.8	.16	23.2	<.1
52G	191A	L5200E+3000S	62	5.6	4.2	26	39	89	.11	1.00	8.1	14	17.8	69.4	4976	56.5	55.2	18.8	3.0	5.9	.18	16.6	.2
52G	191A	L5200E+3000S	65	5.7	4.2	27	29	87	.13	.99	6.6	13	18.3	61.0	4503	50.0	49.8	21.7	2.3	5.1	.15	24.1	.6
52G	191A	L5200E+3000S		5.2	4.0	28		67			2.0		72.8	22.7	1077	16.4	10.1	20.5	.8	3.2	.05	6.7	.3
52G	191A	F1100N	121	4.0	3.6	38	81	93	.07	1.04	12.6	25	4.3	80.9	4180	48.4	45.7	53.8	.9	5.0	.09	41.3	.5
52G	191A	F1100N	104	4.1	3.5	13	44	88	.11	.98	7.5	12	8.5	74.2	5126	58.6	58.4	14.0	4.2	6.1	.10	22.5	.3
52G	191A	F1100N	95	4.2	3.5	12	42	85	.14	.97	5.6	9	8.7	70.4	5101	56.7	52.6	21.8	2.6	5.8	.10	26.1	.3
52G	191A	F1100N	24	4.6	3.6	13	22	71			2.5		53.0	37.6	2383	28.6	15.8	22.0	1.3	3.9	.08	13.1	.7
52G	191A	B1000E	124	4.0	3.0	14	80	93	.07	1.07	13.5	27	3.9	79.4	4198	48.1	46.9	34.4	1.4	4.4	.10	42.1	2.4
52G	191A	B1000E	97	3.8	2.9		46	88	.12	.98	7.0	13	5.0	72.0	5037	56.5	55.3	14.1	4.0	5.6	.12	28.8	<.1
52G	191A	B1000E	102	3.8	3.0		33	87	.13	1.02	6.7	15	3.5	72.3	5265	58.3	56.5	26.5	2.2	6.0	.17	29.8	.1
52G	191A	B1000E	129	4.3	3.3	20	51	89	.11	1.01	8.1	15	4.3	70.9	5317	60.2	59.3	24.1	2.5	6.3	.15	26.5	.3
52G	191A	B1000E	83	4.5	3.5	30	54	89	.11	1.09	8.3	15	7.2	67.8	4937	56.6	55.1	21.8	2.6	5.7	.13	27.8	.3
52G	191A	B1000E	81	4.6	3.6	35	49	89	.11	1.01	7.9	12	10.7	64.7	4620	52.4	51.9	21.8	2.4	5.4	.29	28.8	1.0
52G	191A	B1000E	79	4.5	3.7	38	67	89	.11	.97	7.9	16	4.7	68.4	4700	55.3	55.1	23.0	2.4	5.9	.17	31.5	.8
52G	226	L900W+ 200N	91	3.5	2.7	59	84	91	.09	1.03	10.1	32	1.6	83.7	4298	50.6	50.3	24.1	2.1	4.5	.08	41.1	.8
52G	226	L900W+ 200N	124	3.6	2.7		47	90	.09	.98	9.2	16	3.2	74.5	4775	55.8	54.4	39.9	1.4	5.6	.06	33.9	.1
52G	226	L900W+ 200N	161	3.8	2.9		47	92	.08	1.05	11.1	17	8.8	82.6	4735	54.7	53.6			5.8	.10	30.6	.1
52G	226	L900W+ 200N	159	3.8	2.9		65	93	.07	1.05	12.3	21	2.4	75.0	4702	54.9	54.5			5.7	.10	36.9	.1
52G	226	L900W+ 200N	128	4.1	3.3	13	41	88	.11	1.02	7.5	12	3.7	73.2	5014	55.8	54.3	32.8	1.7	5.7	.10	33.0	<.1
52G	226	L900W+200N	101	4.2	3.4	19	42	87	.13	1.01	6.7	10	4.8	86.5	4696	58.2	57.9	30.6	1.9	6.0	.11	29.0	<.1
52G	226	L900W+200N	102	4.5	3.7	34	45	87			6.7		6.6	69.6	4948	56.4	55.6			5.7	.12	31.2	<.1
52G	226	L400W+1000N	164	4.2	3.1	19	84	95	.05	1.05	17.4	31	4.0	82.7	4458	50.3	49.8	38.7	1.3	4.5	.11	39.8	.4
52G	226	L400W+1000N	165	3.9	2.9		57	92	.07	.98	11.9	20	3.3	76.6	4751	53.0	52.6	31.2	1.7	5.0	.09	36.9	.2
52G	226	L400W+1000N	173	4.0	3.2	13	56	91	.09	1.06	10.1	19	1.9	76.3	4887	54.5	54.3	38.9	1.4	5.3	.06	36.8	.1
52G	226	L400W+1000N	143	4.2	3.5	26	56	90	.10	.98	8.6	15	2.6	70.9	4922	53.9	51.0	36.2	1.5	5.8	.08	36.2	<.1
52G	226	L400W+1000N	73	4.3	3.6	24	58	86	.14	1.00	5.9	9	4.8	68.8	4804	56.1	54.6	43.2	1.3	5.8	.12	31.9	.2
52G	178	B1300E	116	4.2	3.1	10	70	93	.07	1.03	12.6	23	3.9	81.0	4357	48.8	45.9	40.7	1.2	4.3	.09	41.7	.4
52G	178	B1300E	134	4.3	3.2	19	56	89	.10	.98	8.4	14	3.6	73.7	5026	54.9	53.7	10.4	5.3	6.0	.11	30.1	.3
52G	178	B1300E	90	4.2	3.4	9	52	90	.10	1.02	8.5	13	3.4	74.5	4469	56.7	55.5	24.7	2.3	6.1	.12	31.4	.3
52G	178	B1300E	112	4.5	3.7	26	53	90	.10	1.03	8.5	13	4.3	72.1	5020	56.3	56.0	28.2	2.0	6.0	.10	31.3	.4
52G	178	B1300E	95	4.9	3.9	31	59	90	.10	1.10	9.1	14	3.7	68.7	4884	55.3	54.1	34.6	1.6	5.4	.08	33.9	.2
52G	178	B1300E	127	5.0	4.2	32	58	93	.07	.97	12.3	18	3.6	71.8	4903	54.2	54.0	25.8	2.1	5.4	.12	34.6	.6
52G	178	B1300E	86	5.4	4.9	100	47	86	.13	1.01	6.3	9	32.6	51.4	3365	38.5	20.4	14.3	2.7	3.6	.47	22.1	2.2
52G	178	B600E	221	3.9	3.0		87	94	.05	.98	16.9	31	2.9	80.8	4256	47.6	45.9	39.7	1.2	4.2	.08	44.0	.3
52G	178	B600E	214	3.7	2.9		51	92	.08	.98	11.2	19	2.9	74.5		53.8	53.0	31.6	1.7	5.7	.18	35.7	.2
52G	178	B600E	194	3.8	3.0		49	91	.09	1.09	10.1	18	2.7	75.3	4698	52.4	51.8	37.4	1.4	5.7	.08	37.7	<.1
52G	178	B600E	162	3.7	3.0		56	90	.10	1.00	8.7	14	1.7	72.5	4999	55.9	55.2	37.3	1.5	6.0	.08	34.8	.1
52G	178	B600E	131	4.0	3.2	2	54	89	.11	1.01	8.2	12	2.9	71.4	4989	55.7	55.1	26.5	2.1	6.0	.09	33.2	.2

											TOP	BOT		PEAT TYPE					VEGETATION COVER							SUR	AV
HG PPM	CA PPM	P PPM	K PPM	AL PPM	FE PPM	PB PPM	MN PPM	MG PPM	CU PMM	ZN PMM	INT (CM)	INT (CM)	HUM 1-9	S	C	L	X	REL POS	T %	TS %	LS %	G %	SP %	FOR	SUB	WAT PH	D-W CM
.14	3193	1098	1823	3464	5806	36	59	911	6	44	0	25	1	10	0	0	0	0	4	0	15	18	99	1	5		23
.05	2681	738	871	3751	3694	15	35	506	4	23	25	40	4	7	3	0	0	1	4	0	15	18	99	1	5		23
.04	2998	661	808	3443	5160	7	36	463	4	21	40	90	3	6	4	0	0	1	4	0	15	18	99	1	5		23
.02	5536	689	1690	7309	12056	9	81	885	13	13	90	130	4	4	6	0	0	2	4	0	15	18	99	1	5		23
.02	6395	602	1984	8519	13233	6	96	1037	14	11	120	160	5	4	6	0	0	3	4	0	15	18	99	1	5		23
.03	6012	286	937	3783	11214	4	87	630	13	13	160	190	3	2	8	0	0	4	4	0	15	18	99	1	5		23
.04	6693	353	1772	7620	10969	2	92	1297	19	22	190	200	4	2	8	0	0	4	4	0	15	18	99	1	5		23
.12	5524	334	1595	1219	9566	13	358	1307	3	42	0	35	1	9	1	0	0	0	0	0	0	55	80	3	4	5.1	2
.06	2544	1615	1653	7097	2478	70	36	607	17	102	35	100	3	4	6	0	0	1	0	0	0	55	80	3	4	5.1	2
.06	4978	406	1100	3453	6530	2	72	830	5	16	100	300	3	2	8	0	0	2	0	0	0	55	80	3	4	5.1	2
.04	6952	226	1087	3573	9312	2	81	1062	9	25	300	350	3	2	8	0	0	4	0	0	0	55	80	3	4	5.1	2
.04	7384	348	2136	6979	13210	<2	87	1500	8	170	350	390	4	2	8	0	0	4	0	0	0	55	80	3	4	5.1	2
.05	7800	343	2002	5791	13690	6	87	1367	9	67	390	410	4	7	3	0	0	4	0	0	0	55	80	3	4	5.1	2
.03	4518	500	2069	1734	5825	19	163	1366	54	62	0	25	1	9	1	0	0	0	5	0	19	32	99	3	3		28
.06	3224	774	924	3374	2303	5	26	675	7	22	25	100	3	9	1	0	0	1	5	0	19	32	99	3	3		28
.04	3616	533	751	3107	2053	5	11	652	10	8	100	175	3	7	2	1	0	2	5	0	19	32	99	3	3		28
.04	4612	434	747	3120	2119	4	11	835	6	8	175	335	4	6	4	0	0	3	5	0	19	32	99	3	3		28
.03	4461	422	653	3134	2202	4	12	796	8	11	335	350	4	2	7	1	0	4	5	0	19	32	99	3	3		28
.03	4337	464	1345	4669	2843	15	15	860	15	9	350	400	4	2	8	0	0	4	5	0	19	32	99	3	3		28
.05	5197	669	1439	6888	4280	4	23	1068	28	14	400	410	5	2	7	1	0	4	5	0	19	32	99	3	3		28
.04	8169	554	1497	7226	6760	7	33	1267	40	12	410	440	4	7	2	1	0	4	5	0	19	32	99	3	3		28
.04	6770	464	910	4814	5556	5	30	1010	47	13	440	495	4	2	7	1	0	4	5	0	19	32	99	3	3		28
.07	10423	553	5850	20574	11317	9	121	4407	45	86	495	542						5	5	0	19	32	99	3	3		28
.08	3994	775	1567	2969	3439	16	106	1035	5	50	0	30	2	10	0	0	0	0	15	0	21	13	99	1	4		24
.04	2667	705	762	2909	1402	<2	16	561	4	12	30	100	4	6	4	0	0	1	15	0	21	13	99	1	4		24
.03	2770	382	453	2012	2332	<2	9	424	2	7	100	150	3	3	7	0	0	1	15	0	21	13	99	1	4		24
.07	2245	437	1105	4173	3046	3	13	373	10	22	150	200	4	3	7	0	0	2	15	0	21	13	99	1	4		24
.26	4096	322	1173	3972	5585	6	22	495	7	8	200	300	3	2	8	0	0	2	15	0	21	13	99	1	4		24
.12	4740	227	1169	2964	6319	9	27	521	6	10	300	350	3	1	9	0	0	3	15	0	21	13	99	1	4		24
.13	6630	183	967	2026	9730	11	37	623	15	27	350	440	3	0	10	0	0	4	15	0	21	13	99	1	4		24
.10	6187	285	1237	3204	15002	10	54	830	26	156	440	510	4	3	7	0	0	4	15	0	21	13	99	1	4		24
.21	8877	434	3536	10935	44558	12	272	2547	29	214	510	590						5	15	0	21	13	99	1	4		24
.08	2166	968	872	2947	2871	15	41	444	5	38	15	40	3	9	1	0	0	1	10	0	10	20	99	1	3	5.0	8
.06	2975	581	1011	4044	13278	4	59	522	5	12	40	200	3	6	4	0	0	2	10	0	10	20	99	1	3	5.0	8
.06	4531	632	1857	7098	23086	12	99	947	16	14	200	240	4	6	4	0	0	4	10	0	10	20	99	1	3	5.0	8
.05	4631	487	1985	7273	21416	8	94	986	15	14	240	270	4	4	6	0	0	4	10	0	10	20	99	1	3	5.0	8
.14	4616	567	1325	2335	31170	28	130	1111	4	61	0	40	2	10	0	0	0	0	0	1	5	24	96	3	6	5.5	4
.09	3920	670	1526	2762	19496	24	84	708	5	114	40	85	3	9	1	0	0	1	0	1	5	24	96	3	6	5.5	4
.06	4727	567	997	2827	19833	7	98	669	4	57	85	150	4	9	1	0	0	2	0	1	5	24	96	3	6	5.5	4
.06	4665	524	1137	3857	19154	7	92	724	5	14	150	225	4	2	8	0	0	3	0	1	5	24	96	3	6	5.5	4
.06	5206	826	2195	8385	23618	24	104	1293	21	17	225	240	4	1	9	0	0	4	0	1	5	24	96	3	6	5.5	4
.02	18360	508	13013	42680	33292	23	371	8772	22	42	240							6	0	1	5	24	96	3	6	5.5	4
.14	2029	936	2303	1933	2787	24	61	966	3	59	0	20	1	9	1	0	0	0	6	0	18	31	99	1	6		11
.08	1906	707	824	2742	4250	8	17	384	4	11	20	100	3	4	6	0	0	2	6	0	18	31	99	1	6		11
.16	2192	670	1315	4609	18684	7	30	596	5	13	100	140	3	3	7	0	0	4	6	0	18	31	99	1	6		11
.05	10888	697	7429	27875	34133	26	176	4582	14	45	140	160	4	6	4	0	0	5	6	0	18	31	99	1	6		11
.39	2426	752	1469	1951	3400	22	139	820	4	42	0	20	1	9	1	0	0	0	6	0	23	14	99	1	3		18
.10	1767	811	727	2721	1906	7	15	311	4	11	20	50	3	6	4	0	0	1	6	0	23	14	99	1	3		18
.11	1846	573	8729	2985	2460	8	16	310	31	5	50	150	4	7	3	0	0	1	6	0	23	14	99	1	3		18
.19	1532	379	641	3325	5274	<2	10	314	2	6	150	200	4	4	6	0	0	2	6	0	23	14	99	1	3		18
.45	2524	325	1217	4142	13755	11	28	555	7	14	200	280	4	6	4	0	0	3	6	0	23	14	99	1	3		18
.08	3873	339	1788	6132	18164	4	44	932	6	31	280	330	4	7	3	0	0	4	6	0	23	14	99	1	3		18
.15	3881	223	824	2561	16260	5	41	549	6	15	330	350	4	3	7	0	0	4	6	0	23	14	99	1	3		18
.16	1055	390	1629	651	1005	13	88	688	2	29	0	35	1	10	0	0	0	0	16	0	26	11	99	1	5	4.4	22
.10	1317	532	278	1929	654	<2	7	249	2	6	35	90	3	4	6	0	0	1	16	0	26	11	99	1	5	4.4	22
.06	1493	506	275	1882	803	2	9	280	2	14	90	150	3	4	6	0	0	2	16	0	26	11	99	1	5	4.4	22
.05	2578	391	239	1681	1114	<2	6	377	1	5	150	210	3	4	6	0	0	2	16	0	26	11	99	1	5	4.4	22
.07	3474	451	421	2784	1706	<2	8	400	2	7	210	250	4	4	6	0	0	4	16	0	26	11	99	1	5	4.4	22
.05	6409	395	637	3503	3843	3	15	596	4	7	250	310	4	3	7	0	0	4	16	0	26	11	99	1	5	4.4	22
.12	6123	362	769	4551	4692	<2	19	712	3	8	310	330	4	2	8	0	0	4	16	0	26	11	99	1	5	4.4	22
.08	1251	380	847	1857	975	18	45	598	2	39	0	30	1	9	1	0	0	0	0	0	11	20	99	1	4		6
.06	1386	517	440	1936	823	6	8	230	2	9	30	90	3	7	3	0	0	1	0	0	11	20	99	1	4		6
.03	1907	410	242	1313	767	5	5	259	2	5	90	170	4	7	3	0	0	2	0	0	11	20	99	1	4		6
.05	5747	333	342	1947	2006	2	12	429	4	14	170	270	3	3	6	0	0	3	0	0	11	20	99	1	4		6
.16	10468	254	435	2761	4072	<2	20	628	5	5	270	310	3	3	5	0	0	4	0	0	11	20	99	1	4		6
.08	1900	365	960	1940	1559	17	67	794	3	30	0	30	1	9	1	0	0	0	2	1	9	16	99	3	4		7
.06	2384	636	449	2287	2252	<2	42	402	6	20	30	120	3	8	2	0	0	1	2	1	9	16	99	3	4		7
.08	3421	514	375	2112	4259	<2	77	431	5	10	120	140	3	6	3	1	0	2	2	1	9	16	99	3	4		7
.07	5558	478	407	2339	6549	<2	170	587	6	9	140	210	3	4	5	1	0	2	2	1	9	16	99	3	4		7
.12	9438	396	349	2036	7855	<2	299	679	6	9	210	290	3	3	6	1	0	3	2	1	9	16	99	3	4		7
.13	8656	356	421	1972	5011	<2	188	554	5	13	290	340	3	2	7	1	0	4	2	1	9	16	99	3	4		7
.14	11499	387	3501	12062	10112	<2	152	2474	21	78	340	440						5	2	1	9	16	99	3	4		7
.11	1464	472	847	1536	1193	19	40	494	2	48	0	30	1	9	1	0	0	0	14	0	24	10	99	1	3	5.0	25
.11	1724	643	495	1898	1001	2	12	306	2	24	30	60	3	8	2	0	0	1	14	0	24	10	99	1	3	5.0	25
.10	1683	535	290	2055	976	<2	8	263	2	11	60	110	4	8	2	0	0	2	14	0	24	10	99	1	3	5.0	25
.08	2378	467	259	1774	1595	2	10	245	2	17	110	160	3	6	4	0	0	3	14	0	24	10	99	1	3	5.0	25
.11	4074	424	411	2375	3537	<2	21	340	3	12	160	210	3	5	4	1	0	4	14	0	24	10	99	1	3	5.0	25

APPENDIX B.5 PHYSICAL AND CHEMICAL CHARACTERISTICS OF PEAT SAMPLES FROM ARMSTRONG AREA. (Refer to Section 3.5 for sources and context of data.)

NTS	PEAT LAND NO.	SAMPLE POINT LOCATION	CAT EX CAP	H2O PH	CACL2 PH	COND	FIB %	MC % WET	DRY BULK DENS	WET BULK DENS	VAL ABSO	CAP ABSO	ASH %	VOL %	NET CAL /G	C TTL %	C ORG %	C:N	N %	H %	S %	O %	AS PPM
52I	103	T3	65	6.2	5.5	120	22	80	.19	.97	4.0	7.7	13.8	64.9	4648	41		18.6	2.2	5.1	.37	37.5	<1
52I	103	T3	92	5.5	4.8	81	23	76	.23	.95	3.1	5.8	11.4	63.9	4867	42		26.3	1.6	5.2	.49	39.4	<1
52I	103	T7	122	5.9	5.0	38	42	82	.19	1.05	4.4	7.6	7.7		4485	56.2		26.8	2.1	5.0	.37	28.6	<1
52I	103	T7	136	5.6		40	36	80	.20	1.07	4.1	7.4	7.4	66.1	4568	46.7		21.2	2.2	5.5	.19	38.1	<1
52I	169	T1300N+400W	72	6.0	5.3	35	18	79	.20	1.01	3.8	6.6	8.5	65.4	4591	49.0		20.4	2.4	5.0	.37	34.7	<1
52I	169	T1300N+400W	58	5.2	5.1	381	21	82	.17	.98	4.6	7.6	7.2	72.9	5040	42.1		21.1	2.0	5.1	.37	43.3	<1
52I	110	T125N+100E	60	5.7	4.5	65	25	83	.16	.97	5.0	8.9	5.3	76.5	5110	38.6		25.7	1.5	5.0	.12	49.5	<1
52I	110	T125N+100E	63	6.3	5.1	59	23	82	.17	.97	4.5	5.2	5.8	67.5	4804	53.4		24.3	2.2	4.5	.11	34.0	<1
52I	110	T125N+100E	67	6.8	6.0	82	22	81	.19	.99	4.1	6.3	31.0	49.7	3888	31.6		15.8	2.0	4.9	.24	30.3	<1
52I	91	L800W+100S	79	5.0	4.5	63	27	84	.15	.94	5.2	9.3	5.8	71.1	4555	47.0		27.6	1.7	5.5	.14	39.9	<1
52I	91	L800W+100S	78	4.9	4.3	38	28	78	.20	.95	3.6	6.9	5.3	68.3	4857	53.8		31.6	1.7	5.0	.13	34.1	<1
52I	46	T8	98	4.2	3.0	21	43	85	.15	1.06	5.8	13.0	3.4	73.6	4909	48.0		28.2	1.7	4.9	.12	41.8	<1
52I	46	T8	96	4.2	3.2	11	43	86	.15	1.09	5.9	13.1	1.6	77.1	4837	48.6		69.4	.7	5.1	.06	43.9	<1
52I	46	T8	97	4.3	3.7	17	38	85	.16	1.11	5.8	9.9	2.9	70.8	5056	51.0		22.2	2.3	5.5	.11	38.2	<1
52I	46	T8	94	4.8	4.0	30	38	84	.17	1.05	5.1	9.9	5.5	69.6	4839	49.0		21.3	2.3	5.2	.31	37.7	<1
52I	46	T8	89	4.5	2.9	26	30	85	.16	1.09	5.7	10.8	4.0	70.4	4812	49.8		22.6	2.2	4.2	.14	39.7	<1
52I	46	T8	91	4.8	3.5	97	40	80	.20	1.05	4.1	8.7	28.1	52.7	3398	37.8		29.1	1.3	4.9	.21	27.7	<1
52I	46	T5	132	3.7	2.9	21	42	84	.17	1.09	5.2	10.9	2.6	75.6	4902	49.1		35.1	1.4	5.2	.12	41.6	<1
52I	46	T5	123	3.9	2.9	<10	44	88	.13	1.06	7.0	16.2	1.2	78.1	4421	49.1		61.4	0.8	5.1	.12	43.7	<1
52I	46	T5	122	3.9	3.0	<10	41	87	.13	1.03	6.4	12.6	1.5		4914	45.8		45.8	1.0	5.1	.11	46.5	<1
52I	46	T5	139	4.1	3.0	15	55	87	.14	1.10	6.6	14.9	1.4		4637	48.0		68.6	0.7	5.1	.24	44.5	<1
52I	46	T5	122	4.1	3.2	17	38	83	.18	1.12	5.0	11.3	1.9	72.0	5198	49.1		37.8	1.3	5.2	.21	42.3	<1
52I	46	T5	92	4.2	3.0	21	47	84	.17	1.10	5.2	10.3	2.2	70.7	5117	48.0		22.9	2.1	5.1	.12	42.5	<1
52I	46	L300N+1200E	70	4.7	3.4	52	27	82	.16	.92	4.6	13.3	3.3	73.7	4555	48.4		34.6	1.4	5.0	.29	41.6	<1
52I	46	L300N+1200E	68	4.4	3.2	43	30	84	.15	.95	5.0	11.7	2.7	72.1	4854	49.9		38.4	1.3	5.0	.35	40.8	<1
52I	46	L300N+1200E	58	4.9	3.7	38	29	82	.18	1.01	4.4	9.6	9.5	65.4	4524	48.7		27.1	1.8	5.5	.13	34.4	<1
52I	129	B000	79	6.7	5.8	281	31	80	.20	.98	3.9	7.5	10.4	68.7	4125	47.8		20.8	2.3	4.9	.08	34.5	<1
52I	129	B000	77	6.2	5.1	34	24	80	.20	1.00	3.8	6.5	16.1	60.8	4134	52.8		25.1	2.1	4.6	.13	24.2	<1
52I	91	T5	304	4.0	3.0	16	38	85	.16	1.11	5.8	11.3	3.3		4660	53.8		33.6	1.6	5.0	.12	36.2	<1
52I	91	T5	111	4.2	3.4	21	32	83	.18	1.10	4.9	12.1	2.6	73.6	4889	51.1		36.5	1.4	5.8	.12	39.0	<1
52I	91	T5	124	4.3	3.7	25	30	82	.19	1.10	4.5	8.5	4.1	68.2	5377	52.3		27.5	1.9	5.2	.11	36.4	<1
52I	91	T5	103	4.6	4.0	35	17	79	.22	1.10	3.8	6.8	6.9		4931	49.1		24.6	2.0	5.1	.21	36.7	<1
52I	91	T5	106		4.0		19	73	.28	1.06	2.6	5.6	7.1		4822	52.3		23.8	2.2	5.1	.21	33.1	<1
52I	91	T5	111	5.1	5.6	34	54	85	.16	1.10	5.6	12.5	5.3	68.9	4559	49.0		272	1.8	4.9	.15	38.8	<1

											TOP	BOT		PEAT TYPE					VEGETATION COVER							SUR	AV
HG PPM	CA PPM	P PPM	K PPM	AL PPM	FE PPM	PB PPM	MN PPM	MG PPM	CU PMM	ZN PMM	INT (CM)	INT (CM)	HUM 1-9	S	C	L	X	REL POS	T %	TS %	LS %	G %	SP %	FOR	SUB	WAT PH	D-W CM
.10	10015	588		4228	6049		128	1178	44	135	0	90	2	3	5	2	0	1	2	0	16	58	87	3	3	5.8	8
.03	20245	329		3448	5946		174	1574	53	33	90	200	3	0	5	5	0	3	2	0	16	58	87	3	3	5.8	8
.01	25492	534		2609	3567		210	1821	12	35	30	70	3	9	0	1	0	2	20					3	3	5.3	
<.01	19244	522	231	2438	3121	4	151	1760	9	29	70	130	3	9	0	1	0	4	20					3	3	5.3	
.12	21273	589	609	2544	12586	14	114	1889	21	37	0	130	2	6	2	2	0	2	6	0	27	33	99	3	3	5.5	20
<.01	14492	705		1685	12945		636	2166	33	89	130	230	3	0	3	7	0	4	6	0	27	33	99	3	3	5.5	20
<.01	8554	596		1566	4374		456	1237	49	159	0	60	2	8	0	2	0	1	4	20	30	10	80	3	5		
.08	20877	616	263	2124	3647	12	103	1207	18	51	60	170	2	3	1	6	0	3	4	20	30	10	80	3	5		
<.01	17116	583		8218	9636		157	3483	37	69	170	200						5	4	20	30	10	80	3	5		
.04	9824	769	1711	2306	2611	25	75	2080	30	45	0	90	2	4	4	2	0	1	11	5	60	10	85	1	1		
.04	12272	457	732	3072	2601	49	32	1484	27	23	90	230	3	3	3	4	0	3	11	5	60	10	85	1	1		
<.01	1678	662		2860	888		11	438	5	14	20	70	3	7	3	0	0	1	2	0	60	22	99	1	3	3.4	
<.01	2632	336	133	1198	713	15	6	578	3	4	70	210	4	8	2	0	0	2	2	0	60	22	99	1	3	3.4	
<.01	4015	460	94	2219	901	8	9	415	2	7	210	320	3	7	2	1	0	3	2	0	60	22	99	1	3	3.4	
<.01	8259	254	962	1249	809	15	51	311	7	<1	320	430	3	8	2	0	0	4	2	0	60	22	99	1	3	3.4	
<.01	5720	281	987	3013	1577	15	22	503	7	<1	430	480	4	10	0	0	0	4	2	0	60	22	99	1	3	3.4	
<.01	10717	305	6418	13278	4183	14	106	1299	14	8	480	500						5	2	0	60	22	99	1	3	3.4	
<.01	1469	572		2056	628		39	334	5	23	40	80	3	9	1	0	0	1	2	0	30	8	99	1	3	4.6	
<.01	1708	303		1649	688		29	443	5	26	80	150	2	9	1	0	0	2	2	0	30	8	99	1	3	4.6	
<.01	1224	420		1568	581		11	377	4	28	150	180	4	10	0	0	0	2	2	0	30	8	99	1	3	4.6	
<.01	2472	263		2296	813		21	536	7	21	180	200	3	9	1	0	0	3	2	0	30	8	99	1	3	4.6	
<.01	1369	434		2225	502		10	306	6	17	200	240	4	9	1	0	0	3	2	0	30	8	99	1	3	4.6	
<.01	2597	414		2949	696		13	275	11	12	240	350	3	9	1	0	0	4	2	0	30	8	99	1	3	4.6	
<.01	7650	524	1093	1794	1608	110	78	1128	21	69	0	130	2	5	5	0	0	1	2	0	60	22	99	1	3	3.4	
<.01	3168	361	804	1989	1013	48	25	604	31	69	130	270	3	4	5	1	0	3	2	0	60	22	99	1	3	3.4	
.02	6447	307	2385	5662	2792	23	29	1002	25	54	270	520	3	4	5	1	0	4	2	0	60	22	99	1	3	3.4	
.01	23043	988	1711	2782	14206	33	348	1919	11	42	0	120	2	3	3	3	0	2	6	0	70	30	80	3	3		
.15	24691	439	2801	7454	9878	22	177	1966	45	63	120	240	3	1	5	4	0	4	6	0	70	30	80	3	3		
<.01	1977	721		2046	891		18	322	5	20	20	60	3	9	1	0	0	1	11	0	45	33	98	1	3	3.8	20
<.01	2556	496	140	1647	831	13	5	292	3	1	60	130	4	8	2	0	0	2	11	0	45	33	98	1	3	3.8	20
<.01	5761	529		4424	2383		10	508	26	11	130	170	4	8	1	1	0	3	11	0	45	33	98	1	3	3.8	20
.03	9984	505		6479	4517		19	813	51	11	170	190	5	9	0	0	0	3	11	0	45	33	98	1	3	3.8	20
<.01	12223	465		5658	6066		34	1079	39	53	190	210	4	10	0	0	0	3	11	0	45	33	98	1	3	3.8	20
<.01	12335	203	441	2766	6718	10	28	970	9	6	210	270	3	10	0	0	0	4	11	0	45	33	98	1	3	3.8	20

APPENDIX B.6 PHYSICAL AND CHEMICAL CHARACTERISTICS OF PEAT SAMPLES FROM LONGLAC-NAKINA AREA. (Refer to Section 3.5 for sources and context of data.)

NTS	PEAT LAND NO.	SAMPLE POINT LOCATION	CAT EX CAP	H2O PH	CACL2 PH	COND	FIB %	MC % WET	DRY BULK DENS	WET BULK DENS	VAL ABSO	CAP ABSO	ASH %	VOL %	NET CAL /G	C TTL %	C ORG %	C:N	N %	H %	S %	O %	AS PPM
42E	95	B1100E	9	6.5	6.1	105	90	92	.08	.99	12.0	26.1	8.0	71.8	4053	54.1	53.2	45.1	1.2	5.4	.02	31.3	.2
42E	95	B1100E	204	6.2	5.7	45	48	87	.14	1.08	6.5	9.1	9.5	64.8	4455	55.2	54.0	16.2	3.4	5.5	.03	26.4	.3
42E	95	B1100E	244	6.6	6.0	69	56	88	.12	1.07	7.5	12.0	9.3	67.0	4380	52.1	51.4	17.4	3.0	5.0	.41	30.2	.3
42E	95	L1000E+400N	177	6.5	6.2	134	52	88	.13	1.08	7.3	11.3	21.9	62.4	3308	51.6	50.0	23.5	2.2	5.9	.04	18.4	11.2
42E	95	L1000E+400N	186	6.4	5.8	29	43	88	.13	1.06	7.4	11.7	9.4	66.1	4429	52.0	50.2	17.9	2.9	5.7	.03	30.0	.1
42E	95	L1000E+400N	235	6.5	5.6	49	41	85	.16	1.07	5.8	8.8	11.0	61.3	4171	51.1	50.0	25.6	2.0	5.6	.07	30.2	<.1
42E	65	B700S	133	6.6	5.9	242	73	90	.11	1.04	8.8	15.4	9.3	66.8	4050	47.8	45.8	23.9	2.0	4.4	.05	36.4	49.8
42E	65	B700S	243	6.5	5.2	25	57	91	.10	1.02	9.6	15.3	5.7	69.6	4735	53.8	52.8	19.2	2.8	5.6	.01	32.1	.4
42E	65	B700S	262	7.0	5.1	22	53	90	.11	1.04	8.9	14.0	6.4	66.2	4656	53.3	52.7	22.2	2.4	5.5	.19	32.2	.4
42E	65	B700S	219	6.8	5.2	22	59	91	.09	1.04	10.4	17.1	4.8	67.6	4704	54.4	53.4	22.7	2.4	6.1	.11	32.2	.2
42E	65	B700S	184	5.8	5.1	28	45	86	.14	1.06	6.4	9.7	10.5	62.0	4316	52.0	51.0	22.6	2.3	5.6	.12	29.5	.5
42E	65	B300S	194	5.6	5.3	216	86	88	.12	1.00	7.5	16.2	5.9	70.8	4306	51.1	50.4	39.3	1.3	5.4	.04	36.3	2.5
42E	65	B300S	175	6.4	5.9	49	47	86	.16	1.08	6.0	8.5	9.9	64.6	4457	53.4	52.8	28.1	1.9	5.5	.10	29.2	.2
42E	65	B300S	242	6.4	5.9	66	42	87	.14	1.08	6.7	10.8	11.8	62.5	4055	48.5	47.0	40.4	1.2	4.3	.17	34.0	<.1
42E	65	B300S	206	6.5	6.1	85	32	81	.20	1.08	4.3	6.4	14.0	60.0	4054	46.1	45.6	35.5	1.3	4.2	.28	34.1	.3
42E	134	B700W	311	4.3	3.3	57	99	91	.09	1.00	9.6	23.2	3.6	77.3	4381	51.0	50.1	51.0	1.0	4.9	.08	39.4	.8
42E	134	B700W	240	5.4	4.7	33	48	89	.12	1.05	7.8	10.9	8.9	66.7	4469	51.2	50.2	25.6	2.0	5.7	.09	32.1	.1
42E	134	B700W	225	5.6	5.0	38	33	80	.22	1.10	3.9	6.1	11.6	62.0	4372	43.0	42.1	25.3	1.7	3.8	.07	39.8	.3
42E	134	L500W+300N	228	6.5	6.0	131	66	90	.10	.99	9.3	18.0	8.2	67.9	4083	49.2	47.8	30.8	1.6	4.8	.15	36.0	.5
42E	134	L500W+300N	241	6.0	5.2	47	45	84	.17	1.09	5.4	7.1	11.4	60.7	4012	49.7	48.0	35.5	1.4	5.0	.12	32.4	<.1
42E	46	L500N+900W	206	6.9	6.3	128	78	90	.11	1.05	8.6	18.4	8.4	68.8	4099	47.6	46.0	25.1	1.9	4.6	.11	37.4	2.6
42E	46	L500N+900W	223	6.4	5.7	40	48	87	.13	1.05	6.8	9.1	8.8	64.7	4470	51.7	50.4	24.6	2.1	5.7	.01	31.7	<.1
42E	46	L500N+900W	213	6.5	5.7	49	44	88	.13	1.05	7.1	9.9	8.9	67.0	4615	51.6	50.2	21.5	2.4	6.0	.06	31.0	.7
42E	46	L500N+1400W	212	7.3	6.9	111	83	91	.09	1.02	10.0	16.7	7.3	68.0	4068	45.1	43.8	19.6	2.3	4.3	.01	41.0	.8
42E	46	L500N+1400W	198	6.3	5.5	41	49	86	.15	1.07	6.3	8.4	9.0	65.1	4355	52.1	51.0	26.1	2.0	5.9	.05	30.9	.2
42E	46	L500N+1400W	261	6.3	5.7	48	40	86	.15	1.05	5.9	9.6	9.1	63.9	4656	54.2	53.0	27.1	2.0	6.1	.06	28.5	<.1
42E	46	L500N+1400W	227	6.3	5.7	49	43	85	.16	1.06	5.5	8.1	9.5	63.3	4531	53.1	52.2	23.1	2.3	6.0	.19	28.9	.2
42E	99	L200N+200W	111	7.2	6.8	229	62	84	.17	1.03	5.2	9.3	10.6	67.2	4092	47.7	46.0	18.3	2.6	4.8	.20	34.1	62.7
42E	99	L200N+200W	212	6.7	6.0	57	55	91	.09	1.02	10.0	14.9	9.3	65.2	4052	49.6	48.4	26.1	1.9	4.9	.05	34.2	6.7
42E	99	L200N+200W	187	6.4	5.9	52	37	86	.15	1.03	5.9	9.7	8.6	66.1	4344	51.9	50.6	22.6	2.3	4.9	.01	32.3	2.3
42E	99	L200N+200W	262	6.3	5.8	50	50	88	.13	1.04	7.3	10.2	10.6	63.1	4201	53.0	52.0	29.4	1.8	5.3	.11	29.2	2.6
42E	99	B300N	157	6.9	6.5	213	79	86	.14	1.05	6.4	8.7	13.1	65.5	3989	45.6	43.9	17.5	2.6	4.8	.34	33.6	147.
42E	99	B300N	89	7.4	6.7	181	35	86	.15	1.04	5.9	9.9	7.1	68.6	4543	52.0	51.4	17.9	2.9	5.4	.02	32.6	3.1
42E	99	B300N	181	6.4	6.1	39	63	92	.08	1.03	11.7	17.1	6.2	70.1	4643	53.0	52.0	20.4	2.6	5.7	.11	32.4	7.3
42E	99	B300N	26	7.5	7.2	207	4	70	.37	1.23	2.3	2.5	66.2	32.2		14.8	13.0	49.3	0.3	.8	.14	17.8	.8
42E	69	L500S+200W	181	6.4	6.4	84	85	92	.08	1.00	11.7	20.7	6.8	73.7	4017	45.6	43.6	65.1	0.7	4.5	.05	42.3	4.1
42E	69	L500S+200W	245	6.4	5.6	43	49	89	.11	1.05	8.3	12.1	7.5	65.0	4292	48.9	47.2	24.4	2.0	5.0	.07	36.5	1.3
42E	69	L500S+200W	236	6.2	5.4	39	53	89	.12	1.07	7.7	10.9	8.0	64.1	4286	53.9	52.8	25.7	2.1	5.4	.18	30.4	.2
42E	69	L500S+200W	208	6.1	5.5	50	35	83	.18	1.06	5.0	8.2	8.2	63.2	4259	52.1	50.8	26.1	2.0	5.3	.25	32.1	.2
42E	69	B200S	189	6.4	5.9	83	82	93	.07	1.01	13.7	23.0	7.7	73.7	4237	47.8	46.0	47.8	1.0	4.5	.08	38.9	11.5
42E	69	B200S	194	6.0	5.4	28	43	89	.12	1.04	7.8	11.7	7.5	66.0	4478	53.5	52.6	107.	0.5	5.3	.06	33.1	.4
42E	69	B200S	225	6.0	5.4	34	42	87	.14	1.06	6.7	10.5	8.7	65.4	4383	51.0	50.0	25.5	2.0	5.4	.09	32.8	.3
42E	69	B200S	256	6.2	5.5	51	49	88	.13	1.07	7.3	12.8	10.7	63.1	4079	51.6	50.2	28.7	1.8	5.1	.11	30.7	.2
42E	80	B100W	202	6.7	6.1	81	70	89	.11	1.03	8.4	16.4	8.6	67.0	3941	49.0	47.9	32.7	1.5	5.3	.36	35.2	.1
42E	80	B100W	267	6.2	5.5	35	43	85	.16	1.06	5.8	7.4	8.9	62.9	4344	53.1	52.2	33.2	1.6	5.4	.10	30.9	.5
42E	80	L1500W+100S	183	6.6	6.1	94	60	88	.13	1.03	7.0	12.3	6.9	71.5	3998	49.1	48.4	32.7	1.5	5.0	.11	37.4	.5
42E	80	L1500W+100S	214	6.2	5.4	35	46	87	.14	1.07	6.9	9.4	9.8	62.3	4554	50.2	49.4	25.1	2.0	4.8	.21	33.0	<.1
42E	80	L1500W+100S	231	6.5	5.5	38	47	86	.15	1.06	6.2	7.9	4.8	62.2	4453	52.0	50.6	28.9	1.8	5.6	.07	35.7	<.1
42E	80	L1500W+100S	226	6.3	5.7	55	38	84	.17	1.06	5.2	7.2	11.7	60.8	4111	50.0	49.2	27.8	1.8	5.5	.14	30.9	.2
42E	80	B2100W	202	6.7	6.3	109	83	87	.12	1.00	7.1	17.8	8.5	69.3	3965	45.2	43.6	32.3	1.4	4.5	.04	40.4	.1
42E	80	B2100W	232	6.5	5.8	57	49	88	.13	1.06	7.1	9.7	10.4	62.9	4077	47.8	46.6	25.2	1.9	4.7	.28	34.9	<.1
42E	80	B2100W	283	6.4	5.6	44	51	87	.13	1.06	6.9	9.2	9.5	64.8	4280	49.8	48.0	22.6	2.2	4.7	.33	33.5	<.1
42E	80	B2100W	227	6.5	5.8	47	40	85	.16	1.08	5.6	7.5	11.5	61.3	4121	47.8	47.0	26.6	1.8	5.0	.18	33.7	<.1
42E	72	L700N+200W	135	6.9	6.5	141	87	89	.11	1.05	8.4	12.4	9.7	68.8	4111	46.3	45.0	25.7	1.8	4.7	.10	37.4	1.2
42E	72	L700N+200W	195	6.1	5.5	36	53	89	.11	1.06	8.4	9.3	7.5	64.5	4492	52.8	51.2	26.4	2.0	5.7	.07	31.9	.1
42E	72	L700N+200W	180	6.2	5.4	61	33	83	.18	1.06	4.9	6.4	10.5	62.2	4216	48.6	47.4	29.3	1.7	4.6	.13	34.6	<.1
42E	72	B1000N	218	5.9	5.1	117	87	93	.07	.99	12.9	29.0	5.7	72.5	4093	46.9	45.6	46.9	1.0	4.4	.03	42.0	.3
42E	72	B1000N	149	6.4	5.3	56	42	87	.14	1.03	6.7	10.1	7.3	65.6	4462	51.0	48.7	22.1	2.2	5.3	.02	34.2	<.1
42E	72	B1000N	150	6.8	6.2	85	49	86	.15	1.07	6.0	8.5	15.4	54.6	3951	48.7	47.0	27.1	1.8	4.4	.49	29.2	<.1
42L	170	L800N+200W	303	6.2	5.7	69	89	92	.24	1.05	11.5	23.5	6.7	72.5	4033	53.8	51.5	35.9	1.5	5.7	.01	32.3	4.3
42L	170	L800N+200W	337	6.1	5.5	41	52	87	.14	1.07	6.9	10.7	8.9	63.5	4133	49.8	47.8	31.1	1.6	4.5	.02	35.2	.4
42L	170	L800N+200W	253	6.4	5.8	47	50	89	.12	1.07	7.8	14.7	11.7	61.3	4035	53.0	51.2	44.2	1.2	5.7	.04	28.4	.2
42L	170	B600N	308	5.1	4.8	94	89	91	.09	.98	10.4	23.2	3.5	78.7	4118	46.6	46.0	42.4	1.1	4.3	.01	44.5	.4
42L	170	B600N	214	6.5	4.2	34	38	86	.15	1.04	6.1	8.8	6.0	65.6	4502	54.9	53.9	22.9	2.4	5.4	.02	31.3	<.1
42L	170	B600N	295	6.0	5.4	40	53	88	.12	1.05	7.6	8.4	7.9	65.5	4347	49.1	47.8	30.7	1.6	4.4	.01	37.0	<.1
42L	170	B600N	127	6.2	5.7	52	41	85	.16	1.06	5.6	9.5	11.2	56.0	4123	55.6	54.6	39.7	1.4	5.4	.15	26.2	<.1
42L	264	B1400E	190	6.6	6.0	284	66	89	.11	1.01	7.8	10.0	8.0	68.9	4138	53.2	52.2	22.2	2.4	5.3	.16	30.9	4.4
42L	264	B1400E	253	5.8	5.5	40	62	90	.10	1.04	9.4	14.2	5.5	68.8	4597	45.6	43.8	15.2	3.0	4.3	.04	41.6	.7
42L	264	B1400E	198	6.3	5.6	49	39	83	.18	1.07	5.0	8.1	26.1	51.0	3474	50.6	49.4	36.1	1.4	5.2	.04	16.7	.6
42L	264	B1900E	208	6.9	6.4	789	93	90	.10	1.02	9.4	19.5	8.5	68.6	3946	54.2	53.6	33.9	1.6	5.8	.04	29.9	6.0
42L	264	B1900E	294	6.0	5.2	32	61	91	.09	1.04	10.1	15.4	6.2	67.5	4455	53.4	53.0	20.5	2.6	5.4	.03	32.4	.4
42L	264	B1900E	269	6.1	5.6	41	60	92	.09	1.05	10.8	15.7	6.3	65.8	4300	50.0	49.0	21.7	2.3	5.1	.08	36.2	<.1
42L	264	B1900E	174	6.6	5.6	42	54	87	.14	1.06	6.6	11.1	11.6	61.6	4008	50.8	49.2	28.2	1.8	5.2	.07	30.5	.3

HG PPM	CA PPM	P PPM	K PPM	AL PPM	FE PPM	PB PPM	MN PPM	MG PPM	CU PMM	ZN PMM	TOP INT (CM)	BOT INT (CM)	HUM 1-9	PEAT TYPE S	PEAT TYPE C	PEAT TYPE L	PEAT TYPE X	REL POS	VEGETATION COVER T %	VEGETATION COVER TS %	VEGETATION COVER LS %	VEGETATION COVER G %	VEGETATION COVER SP %	FOR	SUB	SUR WAT PH	AV D-W CM
.04	29100	560	1900	2000	4200	8	565	2230	2	32	0	10	1	9	0	1	0	0	4	0	37	14	95	3	3	5.2	14
<.03	35000	460	500	3400	7100	<2	120	1600	<1	42	30	130	4	10	0	0	0	2	4	0	37	14	95	3	3	5.2	14
<.03	30200	300	500	3700	6900	<2	55	1320	2	36	130	230	5	10	0	0	0	3	4	0	37	14	95	3	3	5.2	14
.05	28000	750	1300	3800	70600	20	1380	2130	<1	102	0	10	1	8	2	0	0	0	0	0	32	22	90	3	4	6.3	7
<.03	28700	460	300	3600	9600	<2	55	1680	<1	20	30	160	4	6	4	0	0	2	0	0	32	22	90	3	4	6.3	7
.04	39500	330	200	4400	9700	<2	70	2030	<1	14	160	190	5	8	0	2	0	4	0	0	32	22	90	3	4	6.3	7
<.03	21100	920	1900	2000	11600	22	1765	1930	2	38	0	30	2	8	2	0	0	1	3	0	18	12	90	3	3	5.5	12
<.03	18100	350	300	2400	1600	<2	35	1200	<1	24	30	100	3	7	3	0	0	1	3	0	18	12	90	3	3	5.5	12
<.03	24500	310	300	3000	2400	<2	30	1450	<1	12	100	140	4	8	2	0	0	2	3	0	18	12	90	3	3	5.5	12
.05	18500	230	300	1900	2700	<2	10	1140	3	16	140	250	3	5	5	0	0	3	3	0	18	12	90	3	3	5.5	12
.03	28200	330	1000	5000	5900	<2	30	1810	2	154	250	292	5	8	1	1	0	4	3	0	18	12	90	3	3	5.5	12
<.03	13600	720	2000	1600	3200	12	785	1490	3	34	0	10	1	9	0	1	0	0	10	1	25	8	95	3	3	5.3	22
.03	38700	740	6400	4800	6800	<2	170	2230	2	36	40	130	4	8	0	2	0	2	10	1	25	8	95	3	3	5.3	22
<.03	53300	660	8500	5900	9500	<2	185	2900	<1	52	130	180	4	9	0	1	0	3	10	1	25	8	95	3	3	5.3	22
<.03	57100	740	9900	6300	11800	<2	185	2970	<1	108	180	220	5	8	0	2	0	4	10	1	25	8	95	3	3	5.3	22
<.03	3500	450	1400	1200	900	4	155	770	1	26	0	10	1	9	0	1	0	0	4	0	38	9	95	2	2	5.1	18
.04	24100	530	1000	3400	3000	<2	125	1230	2	46	30	80	3	7	1	2	0	3	4	0	38	9	95	2	2	5.1	18
.07	31200	360	1600	5700	3800	<2	105	1760	<1	28	80	110	4	8	0	2	0	4	4	0	38	9	95	2	2	5.1	18
<.03	25600	840	2100	2400	1300	<2	1015	2090	2	50	0	30	2	8	0	2	0	1	12	0	22	18	95	3	2	5.3	35
.11	42300	440	1000	4000	4500	6	90	2140	6	22	30	70	4	8	0	2	0	3	12	0	22	18	95	3	2	5.3	35
.06	26400	830	2300	1400	5400	<2	5235	2440	2	76	0	10	2	8	0	2	0	1	4	0	26	25	95	3	3	5.7	15
<.03	31500	430	900	3500	4000	2	560	1730	<1	20	10	130	3	8	0	2	0	2	4	0	26	25	95	3	3	5.7	15
.05	28800	290	900	3900	5200	<2	200	1410	2	14	130	180	4	9	0	1	0	4	4	0	26	25	95	3	3	5.7	15
<.03	26700	710	1700	1800	3700	4	1345	2560	2	48	0	20	2	7	2	1	0	1	4	0	30	34	95	3	4		20
.10	31300	500	800	3400	4000	<2	230	1790	2	22	20	70	3	8	1	1	0	2	4	0	30	34	95	3	4		20
<.03	29400	370	900	3800	4500	<2	110	1370	2	16	70	140	4	8	0	2	0	4	4	0	30	34	95	3	4		20
.14	33700	310	700	3900	5700	<2	90	1310	5	12	140	180	5	10	0	0	0	4	4	0	30	34	95	3	4		20
.09	28100	800	1600	3500	4200	6	595	2100	5	34	0	10	1	9	1	0	0	0	1	0	34	7	40	3	4	6.3	25
.04	44200	530	600	3400	2400	<2	50	2440	3	28	30	110	4	9	1	0	0	1	1	0	34	7	40	3	4	6.3	25
.04	37100	390	500	2700	3800	<2	35	2020	2	14	110	220	4	7	2	0	0	2	1	0	34	7	40	3	4	6.3	25
<.03	39700	370	700	2700	8700	<2	75	1940	<1	28	220	320	5	9	0	1	0	4	1	0	34	7	40	3	4	6.3	25
.12	28500	950	1800	3900	15700	12	2165	2140	3	92	0	10	1	6	3	1	0	0	1	0	14	40	65	3	4	6.1	7
.06	29500	440	400	2500	3000	<2	345	1680	2	20	30	150	4	10	0	0	0	2	1	0	14	40	65	3	4	6.1	7
<.03	23900	260	400	1900	2400	<2	160	1630	2	24	150	300	3	9	1	0	0	3	1	0	14	40	65	3	4	6.1	7
<.03	367100	60	2000	12700	2300	<2	285	6630	<1	2	300	390						6	1	0	14	40	65	3	4	6.1	7
<.03	26700	470	1300	1600	2000	<2	880	2630	2	32	0	10	1	9	0	1	0	0	4	0	26	14	95	3	4	5.6	25
<.03	33800	490	500	2300	2200	<2	435	2140	6	14	30	120	3	8	2	0	0	1	4	0	26	14	95	3	4	5.6	25
<.03	36300	380	400	2800	3900	<2	410	1850	9	10	120	180	4	8	1	1	0	3	4	0	26	14	95	3	4	5.6	25
.04	36300	350	300	2800	4100	<2	395	1790	9	14	180	250	4	8	0	2	0	4	4	0	26	14	95	3	4	5.6	25
<.03	32700	750	2000	1900	10400	4	2985	3020	3	64	0	10	1	6	3	1	0	0	2	0	20	22	95	3	4	5.3	20
.07	25900	370	500	2400	2800	<2	110	1510	2	24	30	110	3	7	2	1	0	1	2	0	20	22	95	3	4	5.3	20
.03	30400	340	500	3000	4800	<2	50	1470	2	22	110	230	4	8	1	1	0	3	2	0	20	22	95	3	4	5.3	20
.05	39100	320	700	4100	8300	<2	60	1560	3	30	230	290	4	9	0	1	0	4	2	0	20	22	95	3	4	5.3	20
.04	28800	760	1300	2700	2100	8	195	2910	2	34	0	10	1	9	0	1	0	0	14	0	26	14	95	3	3	5.5	26
.03	32700	290	500	3300	3200	<2	105	2210	2	20	30	110	4	8	0	2	0	3	14	0	26	14	95	3	3	5.5	26
<.03	24500	620	1400	1700	1700	<2	870	2800	2	40	0	20	2	7	0	3	0	1	7	0	25	9	95	3	4	5.4	17
<.03	32000	400	400	3400	1200	<2	65	2260	<1	24	20	80	3	7	2	1	0	1	7	0	25	9	95	3	4	5.4	17
<.03	37900	260	400	3400	3100	<2	40	1910	2	22	80	190	4	8	0	2	0	3	7	0	25	9	95	3	4	5.4	17
.04	45300	270	700	4800	6600	<2	55	1830	<1	18	190	230	5	8	0	2	0	4	7	0	25	9	95	3	4	5.4	17
.08	31500	750	1600	2400	1500	10	1595	2920	2	52	0	20	2	8	0	2	0	1	6	0	38	12	95	3	4	5.6	30
.04	42700	640	600	3100	2200	<2	1085	2820	3	24	20	70	3	6	2	2	0	2	6	0	38	12	95	3	4	5.6	30
<.03	38700	390	400	2500	2500	<2	275	2290	2	24	70	140	3	8	0	2	0	3	6	0	38	12	95	3	4	5.6	30
<.03	43300	370	600	3400	5000	<2	210	2260	3	12	140	180	4	8	0	2	0	4	6	0	38	12	95	3	4	5.6	30
<.03	24000	830	1600	3200	3400	6	945	2410	2	32	0	20	2	8	2	0	0	1	2	0	20	22	95	3	4	5.4	20
.04	31700	370	400	3100	1600	<2	110	1850	2	<2	20	160	3	8	0	2	0	2	2	0	20	22	95	3	4	5.4	20
<.03	38650	285	800	3750	3400	<2	68	1655	3	19	160	230	4	9	0	1	0	4	2	0	20	22	95	3	4	5.4	20
.03	17400	680	3500	900	1300	<2	1330	2100	3	38	0	20	2	10	0	0	0	1	7	1	30	26	95	3	3	5.3	35
<.03	33700	500	350	2400	2400	<2	213	1840	6	8	20	250	3	7	1	2	0	2	7	1	30	26	95	3	3	5.3	35
<.03	40800	280	1700	6100	4500	<2	85	2700	4	6	250	350	4	9	0	1	0	4	7	1	30	26	95	3	3	5.3	35
.03	17400	830	1800	1700	5200	12	1895	1900	2	34	0	10	1	9	0	1	0	0	2	0	26	10	95	3	5	5.4	22
<.03	41800	470	400	3500	4100	<2	160	1990	<1	24	20	120	4	7	1	2	0	2	2	0	26	10	95	3	5	5.4	22
.03	50500	380	600	3900	6100	<2	100	2370	<1	32	120	220	3	9	1	0	0	3	2	0	26	10	95	3	5	5.4	22
.06	10000	580	2100	700	1100	4	1715	2250	3	50	0	10	1	9	0	1	0	0	2	0	25	10	95	3	5	5.3	18
<.03	24900	440	200	2500	1700	<2	40	1310	2	18	20	120	3	7	2	1	0	1	2	0	25	10	95	3	5	5.3	18
<.03	31600	300	400	3100	3300	<2	45	1450	2	14	120	190	3	8	0	2	0	3	2	0	25	10	95	3	5	5.3	18
<.03	43800	250	600	4900	6300	<2	75	1820	3	10	190	270	4	9	0	1	0	4	2	0	25	10	95	3	5	5.3	18
<.03	26000	900	1200	2000	6800	12	615	2360	2	26	0	20	2	6	2	2	0	1	4	0	16	21	90	3	4	5.9	9
.06	23500	480	100	1800	2300	2	105	1690	1	<2	20	170	3	6	4	0	0	3	4	0	16	21	90	3	4	5.9	9
<.03	32100	450	5300	17800	8300	<2	140	3660	<1	16	170	240						5	4	0	16	21	90	3	4	5.9	9
<.03	27100	910	2300	1800	7600	10	2740	2570	2	48	0	10	1	9	0	1	0	0	6	0	25	12	90	3	4	5.8	14
<.03	25100	490	200	1600	2900	<2	155	1700	2	52	20	160	3	6	3	1	0	2	6	0	25	12	90	3	4	5.8	14
<.03	27900	410	100	1500	3800	<2	130	1760	3	24	160	200	3	8	2	0	0	3	6	0	25	12	90	3	4	5.8	14
<.03	34600	410	1000	4600	6700	<2	140	2130	6	36	200	280	4	8	0	2	0	4	6	0	25	12	90	3	4	5.8	14

Appendix C. Keys to Wetland Classification used by the Ontario Peatland Inventory Project, and the Site Data Record Form

For the preparation of peatland classification mapping and the classification of vegetation types by field crews, the following keys were used on peatlands across Ontario. The classification system is hierarchical so that it can be used at several levels of detail depending on the user's need or on the data available. At it's most detailed level, the classification would include the following:

	Example:
1 FORMATION	1 BOG
1a SUBFORMATION	1a TREED
2 Physiognomic Group	2 Low Shrub
3 Dominance Type	3 *Picea mariana-Chamaedaphne calyculata*
4 Site Type	4. *Picea mariana*^{26}-*Chamaedaphne calyculata*^{42}-*Sphagnum fuscum*^{77}

In the Peatland Inventory Project, classification mapping was conducted to the level of physiognomic group; e.g., TREED low shrub BOG. The dominance type or site type is not mapped but is recorded by field crews; superscripts refer to percentage cover values of particular species.

Where suitable data are available, similar superscripts were applied to mapping units at the physiognomic level; e.g., TREED^{22} low shrub^{42} BOG, or T^{22}ls^{42}B. The classification keys include abbreviations of all units in order to simplify mapping. Abbreviations are always in the order of Subformation (where applicable)—Physiognomic Group—Formation. Other modifiers reflecting site history may also be added; e.g., (P) for post-fire succession.

This type of classification has been in use by field workers for several years. It is modified from the initial system proposed by Zoltai et al. (1973), Jeglum et al. (1974), Jeglum and Boissonneau (1977), Tarnocai (1979), with the addition of published and unpublished data from elsewhere in the province (e.g., Maycock (in preparation) in the south, and Ahti and Hepburn (1967), Riley and McKay (1980), and Riley (1981) in the extreme north).

The following keys are presented in this order:

1. Key to Wetland Formations
2. Key to Subformations
   - A. Bog, Fen, Palsa/Peat Plateau
   - B. Maritime Shorelines
3. Key to Physiognomic Groups
   - A. Swamps
   - B. Bog, Fen, Palsa/Peat Plateau
   - C. Marsh and Meadow Marsh
4. Other Modifiers
5. Keys or Catalogues of Dominance Types
6. Schematic of Subformations and Physiognomic Groups as Applied to Wetland Formations in Ontario
7. Common Names of Plant Species Frequent on Ontario Peatlands/Wetlands

1. KEY TO WETLAND FORMATIONS

A. Well-drained hilltops, steep to moderate slopes, sand flats, levees, beach ridges, permafrost tundra, bedrock outcrop, littoral banks, etc. Stands normally dominated by dry land species of trees and herbaceous or evergreen shrub or ground vegetation. Or, large expanses of open standing or flowing water greater than 2 m deep and/or more than 10 ha in size during drawdown period.

.....NON-WETLANDS
(MINERAL/SOIL UPLAND AND DEEP WATER)

A. Basins, depressions, adjacent low slopes, areas with restricted drainage, drainways, floodplains, littoral terraces, and seasonally or tidally flooded areas. Water table at, near or above the land surface for part of the year, or saturated long enough to promote wetland or aquatic processes such as hydric or organic soils, or hydrophilic vegetation. Some wetlands may have seasonally variable water levels ranging from flooded spring conditions to summer drought conditions with water tables 50 cm or more below the average land or peat surface.

....WETLANDS

1. Well-defined aquatic basins or shoreline zones transitional to deep water areas; inorganic or organic substrates. Vegetation of submergent, floating or emergent species in standing water less than 2 m deep, or on exposed substrate during water drawndown periods such as low tides or summer drought. Periodically or permanently flooded by silt- or nutrient-enriched lake or river waters. In exposed wave-washed situations, may be on mineral soil, whereas muck and/or peat may accumulate in less disturbed sites, sometimes to depths of greater than 40 cm (i.e., organic soils greater than 17 percent organic carbon (C), greater than 30 percent organic matter by weight).

2. Basins or basin margins covered at least 75 percent by permanently open water, usually less than 2 m deep and associated with flowing or standing lakes, rivers or ponds. Usually with sparse floating, submergent or partly emergent vegetation (less than 25 percent cover by emergents).

........SHALLOW WATER (W)

2. Unconsolidated, open, flat or depressed surface dominated by herbaceous emergent sedges, grasses, cattails and reeds (greater than 25 percent cover), or low shrubs; interspersed in standing water (or emergent at low water levels). With occasional small pools and channels, and with exposed patches of mineral or organic soils during seasonal (or tidal) water drawdowns. Often associated with and periodically flooded by the mineral-enriched ground waters of open stream or rivers, flowing lakes, glacial depressions, or marine terraces or flats. Can be contiguous to or grade into Thicket SWAMP with a shrub element up to 25 percent cover. (MARSH is distinguished from the the semiterrestrial Meadow MARSH (mM) by its standing water usually present and its more closed vegetation. Both MARSH and Meadow MARSH may occur on sedge peat, muck or mineral soils. The distinction between these is difficult in tidal and broad littoral sites where water drawndown or incursion varies seasonally or daily, such as in spring floods or neap/storm tides. For those and other sites with more or less variable standing water (such as beaver meadows), the term Meadow MARSH (mW) has been used by Jeglum and Boissonneau (1977), and Riley and McKay (1980).

...............MARSH (M)

1. Less well-defined basins in which open standing water is absent or restricted to scattered small pools, often of a seasonal nature; substrates of saturated (or seasonally dry) peat greater than 40 cm deep.

3. Predominantly ombrotrophic or weakly minerotrophic peatlands, developed on acidic peat (pH of water 10 cm below water table usually less than 5.2, unless water has been significantly drawndown by summer drought).

Accumulation of peat greater than 40 cm dominated surficially by poorly decomposed sphagnum peat; isolated from mineral soil water movement. Strictly ombrotrophic peatlands usually have ground water pHs less than 4.2 (4.4), with calcium (Ca) levels less than 2 ppm.

4. Forming a level, gradually raised (domed), or sloping surface with a (usually) hummock-hollow topography, usually with a continuous carpet of mosses dominated by *Sphagnum* spp. (particularly *S. fuscum* in the hummock phase). Usually with a ground cover of graminoids or of mostly ericaceous shrubs, without trees or with short trees (less than 10 m) with more or less open canopy (usually less than 25 percent, *Picea mariana*, or *Larix laricina* in transitional sites). Lacking species indicative of minerotrophy (*see* Key 3). With or without subsurface discontinuous permafrost or seasonal frost; occasionally with incipient palsa formation north of ca. 51°N.

......BOG (B)

4. Forming an erratic topography of (perennial) permafrost eruptions (palsas) or coalesced palsa fields (peat plateaus) rising greater than 2 m above ambient landform level, with more or less continuous frozen peat cores and often with patterning of interstitial bog/fen drainways at the ambient landform level. Surface vegetation dominated by lichens, ericaceous shrubs, with or without tree cover (*Picea mariana* up to ca. 25 percent).

......PALSA/PEAT PLATEAU (PP)

3. Predominantly minerotrophic wetland, developed on graminoid, woody or "brown moss" peat, or, if with abundant sphagnum at the surface, not usually underlain with a continuous horizon of pure sphagnum peat greater than 30 cm; sites variably influenced by lateral or groundwater input of mineral soil water.

5. Minerotrophic wetlands, heavily wooded or with shrub thickets over 2 m tall greater than 25 percent cover. Usually with hummocky surface broken by wet interstitial hollows, or relatively flat with many spring-flooded pools; with greater than 25 to 30 percent canopy cover of trees (or shrubs greater than 2 m tall in Thicket SWAMP). Substrate of mixtures of transported mineral and organic sediments, or peat (usually woody or with sphagnum surface) deposited *in situ*. Often seasonally flooded or flooded by beaver dams, or with interstitial hollows of standing water and hummocks restricted to deadfall or tree/shrub bases; flooding can decrease tree density to less than 25 percent by dieback. (Distinguished from the rarer High Density TREED BOG by its location on the wetter edges of peatlands, or by the occurrence of an understorey of *Alnus rugosa* or *Salix* spp., or surficial substrate of sphagnum peat less than 30 cm, or by the more vigorous growth of trees, often those over 10 cm DBH (Diameter Breast Height) greater than 25 percent cover.)

.......SWAMP (S)

(Occasionally some heavily treed conifer peatlands keying out as SWAMP differ from typical swamps in occurring on deep, more or less dry peats, and having such dense canopy closure that almost no shrub or ground cover persists. *Larix laricina* and *Picea mariana* have been noted as the dominant species on such sites in both northern and southern Ontario. Because of the density of tree growth and the dryness of the peat, they may be better classified as PEAT FOREST (FP).)

5. Open or sparsely wooded minerotrophic wetlands with level or depressional surfaces except for low hummocks or ridges; dominated by sedges, grasses and/or (mostly) nonericaceous shrubs. Tree cover may reach 25 percent in FENS (*Larix laricina, Thuja occidentalis*) but is usually less than 10 m in height and has an understorey of low shrubs and/or graminoids rather than tall alder or willow shrubs; pools of open water or drainage tracks may be present.

6. Open or sparsely wooded, with relatively uniform and consolidated surface, north of 50°N often with subparallel ridges or elevated islands, linear drainage features and small dispersed pools; more homogeneous physiognomically in the south and often with clumped cedar surface. Vegetation consists of short sedges and grasses, and a variable layer of (mostly) nonericaceous shrubs and trees. Often associated with the so-called "brown mosses" (*Campylium stellatum, Aulocomnium palustre, Drepanocladus revolvens, Tomenthypnum nitens, Scorpidium scorpioides, Paludella squarrosa, Calliergon giganteum*) if pHs greater than 5.5, or with *Sphagnum* spp. if pH is 5.0 to 6.0, or by "marl peats" if pHs greater than 7.0. May be contiguous to open water or open drainage systems, in which case the trophic level of the peatland may reflect the water chemistry of the adjacent water body. For instance, in infilling "kettle" depressions, fen margins and floating mats around acidic 'kettle' lakes may be only weakly minerotrophic and, thus, bog-like in varying degrees (Schwintzer 1978, 1981; Vitt and Slack 1975). Root or stump hummocks are common, and hollows may or may not have shallow water present over the peat.

......FEN (F)

6. In many FENS, conditions are only weakly minerotrophic, and both BOG and FEN indicator species exist. Often sphagnum and black spruce are dominant, particularly in the "hummock" phase, and a site will appear to be transitional in terms of succession from FEN to BOG. Such formations may be termed OPEN or TREED Poor FEN (OPF or TPF).

   Because this classification unit is more nutrient related than physiognomic, it should probably not be considered as a formation of equivalent importance to the others. It should only be used "as a last resort" by workers experienced with the full range of peatland nutrient conditions. It does, however, provide a descriptive means of characterizing some extensive peatlands in the James Bay Lowland and the Northern Clay Belt in particular. Interpretation of Poor FEN solely on the basis of airphotos is probably unreliable.

......Poor FEN (PF)

2. KEY TO SUBFORMATIONS

A. Bog, Fen, Palsa/Peat Plateau

1. Cover by tree species greater than 150 cm tall less than 10 percent.

.......OPEN (O^x)

(Abbreviated to O^x if a superscript annotation of canopy cover percentage is available; for example, O^8).

1. Cover by tree species which are greater than 150 cm tall greater than 10 percent (rarely to 50 percent); tree species greater than 10 cm DBH less than 25 percent cover.

......TREED (T^x)

(Abbreviated to T^x if a superscript annotation of canopy cover percentage is available; for example, T^{22}: otherwise refer to 2).

2. 10 to 15 percent cover by tree species greater than 150 cm tall.

.......Low Density TREED (T(ld))

2. 15 to 25 percent cover by tree species greater than 150 cm tall; greater than 25 percent cover on occasion.

.....Medium Density TREED (T(md))

Where cover by tree species greater than 150 cm tall greater than 30 percent cover, and trees over 10 cm DBH greater than 25 percent cover, the stand may usually be considered to be SWAMP. High Density TREED BOG (T(hd)B; canopy greater than 25 percent) is a much less frequent site type in Ontario, occurring in the central (or raised) areas of well-developed bogs, with less vigorous tree growth than Conifer SWAMP. It is not associated with *Alnus rugosa* or *Salix* spp. which occupy more minerotrophic and wetter areas of peatland edges and drains. High Density TREED BOG is usually dominated by *Ledum groenlandicum* in the shrub storey, and is transitional to the *L. groenlandicum* type of *Picea mariana* SWAMP. This distinction may be difficult to judge on airphotos from much of northern Ontario.

B. Maritime Shorelines

In maritime Ontario, two other modifying terms are used at the subformation level, both referring to MARSH, Meadow MARSH and Thicket SWAMP. These refer to wetlands other than peatlands. They are physiographic rather than formational modifiers, but relate strongly to the floristic composition of Dominance Types within otherwise similar Physiognomic Units.

1. Formations within the marine (saline) influence of James Bay and Hudson Bay.

........COASTAL (C)

1. Formations subject to tidal effects ameliorated by the freshwater influence of major rivers.

.....ESTUARINE (E)

3. KEY TO PHYSIOGNOMIC GROUPS

A. SWAMP

1. Tree species dominant.

   2. Conifers dominant (*Picea mariana, Larix laricina, Thuja occidentalis*).

.......Conifer (c)

(Conifer swamp on peatlands or organic soils vary considerably in their nutrient status and dominance types. In this physiognomic classification, that variation is not recognized. However, a more detailed nutrient-related classification may be required by workers. In such cases, reference should be made to the Forest Ecosytem Operational Groups 11–13 (Jones et al. 1983) for more detailed mapping units useful across most of northern Ontario: OG11, *Picea mariana–Ledum groenlandicum*; OG12, *Picea mariana–Alnus rugosa*-herb poor; OG13, *Picea mariana*; (*Larix laricina, Thuja occidentalis*)–*Alnus rugosa*-herb rich.)

   2. Deciduous (hardwood) trees dominant (*Fraxinus nigra, F. pennsylvanica, Populus* spp., *Acer saccharinum, A. rubrum, Ulmus americana, Salix nigra, Carya* spp., *Quercus macrocarpa, Q. palustris, Nyssa sylvatica*, etc.)

.......Deciduous (h)

(Note that Mixed SWAMPS may be classified as follows: conifer (subdominant)-deciduous (dominant) SWAMP as chS, deciduous (subdominant)-conifer (dominant) SWAMP as hcS; superscripts may be used to indicate respective cover percentages; e.g., $h^{35}c^{15}S$. The same procedure may be used with mixed thicket-deciduous SWAMP, thS or htS. Alternately, a simple Mixed SWAMP category may be considered appropriate.)

.... Mixed (m)

1. Tree species less than 25 percent cover and shrub species over 2 m tall greater than 25 percent (*Alnus rugosa, Salix petiolaris*, other *Salix* spp., *Betula*

pumila var. *glandulifera, Cornus stolonifera, C. racemosa, Rhus vernix, Cephalanthus occidentalis, Ilex verticillata,* etc.). Grades into Shrub-rich MARSH in southern Ontario, from which it can be distinguished by its firm, more or less consolidated peat surface, its relative lack of open drainways and streams, and its denser and taller shrub cover.

.......Thicket (t)

B. BOG, FEN or PALSA/PEAT PLATEAU

1. Shrubs present, as low or dwarf shrubs less than 150 cm greater than 25 percent cover, or tall shrubs 10 to 30(40) percent cover. Where the height of shrub cover is not discernible from airphoto interpretation or when field data is unavailable, the generic Physiognomic Group 'Shrub-rich' (sr) can be used, and understood to include both tall shrub and low shrub groups. In very few cases should more than a single physiognomic modifier be applied; where more than one may be considered applicable, the shrub storey takes precedence over the graminoid/herb and sphagnum layers, the graminoid/herb layer takes precedence over sphagnum, and the latter is used only where neither shrub nor graminoid/herb layer is significant by the definitions used below.

   2. Shrubs over 150 cm tall 10 to 30 (40) percent cover, in northern Ontario, shrub species include *Chamaedaphne calyculata* (B,F), *Kalmia angustifolia* (B), *Thuja occidentqlis* (F, as scrub cedar), *Betula pumila* var. *glandulifera* (F), *Salix pedicellaris* (F), *Myrica gale* (F); in southern Ontario, the above species and *Aronia melanocarpa* (B,F), *Nemopanthus mucronata* (B), *Vaccinium corymbosum* (B), (B and F indicate general BOG or FEN tendencies).

   ......Tall Shrub (ts)

   2. Shrubs, where present, mostly 20 to 150 cm tall (or with less than 10 percent cover by shrubs greater than 150 cm); low candelbra or layered black spruce less than 135 cm would be included in percentage estimates of shrub cover; shrubs less than 135 cm tall greater than 25 percent cover (10 percent in the Hudson Bay Lowland) forming the main visual impact but sites may also have significant graminoid component; includes most of the shrub species listed for Tall Shrub sites, with the addition of dwarfed candelabra *Picea mariana* (B), *Ledum groenlandicum* (B,F), *Andromeda glaucophylla* (B,F), *A. polifolia* (F), *Vaccinium myrtilloides* (B), *Rhamnus alnifolius* (F), *Potentilla fruticosa* (F), *Gaylussacia baccata* (B), (B and F refer to general BOG or FEN tendencies). 'Semi-shrubs' such as *Vaccinium oxycoccus, V. macrocarpon, Rubus pubescens, R. chamaemorus, R. acaulis, Gaultheria hispidula,* should not be included in shrub cover values.

   ......Low shrub (ls)

   2. On PALSA, PEAT PLATEAU, and some BOG and FEN sites in extreme northern Ontario, shrubs may be very low, less than 20 cm tall and over 10 percent cover; these represent extremes of climatic exposure or ombrotrophy and the physiognomic group 'Dwarf Shrub' (ds) should be used. As with Low Shrub types, 'semi-shrubs' should not be considered in this distinction.

   ....Dwarf Shrub (ds)

   (In extreme northern Ontario, OPEN and TREED BOG and PALSA/PEAT PLATEAU can have a conspicuous lichen cover (*Cladina* spp.) over 45 to 50 percent cover, and should be indicated as Lichen-rich (lr) Low Shrub (ls) Formations.)

   ....Lichen-rich (lr)

1. Shrubs either not present or present at cover values less than indicated above.
   3. Firm peatland above water most of the year.
      4. Conspicuous graminoid layer (sedges, grasses, reeds) greater than (8) to 10 percent cover; graminoid cover exceeds shrub cover percentage:

characteristic species are *Carex aquatilis* (F), *C. chordorrhiza* (F), *C. diandra* (F), *C. interior* (F), *C. lasiocarpa* (F), *C. limosa* (B,F), *C. livida* (F), *C. oligosperma* (B), *C. microglochin* (B), *C. pauciflora* (B), *C. pauperculua* (B), *C. rostrata* (F), *C. stricta* (F), *Equisetum fluviatile* (F), *Eriophorum spissum* (B), *E. viridicarinatum* (F), *Scirpus cespitosus* (F,B), *S. hudsonianus* (F), *Triglochin maritimum* (F), (B and F refer to general BOG and FEN tendencies); included in this layer are peatland forbs and 'semi-shrubs' such as *Vaccinium oxycoccus* (B,F), *Rubus chamaemorus* (B), *R. acaulis* (F,?B), and *Gaultheria hispidula* (B,F).

......Graminoid (g)

4. Sphagnum moss dominant at surface; shrubs, herbs and graminoids less than 10 percent cover.

......Sphagnum (sp)

3. Small water bodies occurring within the peatland, often with a patterned distribution; usually contiguous with Open BOG or FEN; rare except for the Hudson Bay Lowland.

......Pool (p)

C. MARSH and MEADOW MARSH

1. Closed graminoid and herb (rarely lowshrub) vegetation behind zones of coastal or shoreline emergent vegetation, and on wet floodplains, terraces or supertidal areas adjacent to open water systems; some of the more common dominant species are indicated in couplet 2. Usually seasonally flooded, flooded in the recent past (e.g., beaver), or subject to storm or neap tide floods; graminoid cover is characteristic so that no Physiognomic modifier (e.g., g) is required. (In supertidal, coastal sites, lowshrub cover (less than 25 percent cover, mostly *Salix* spp.) may be dominant and can be indicated as Low Shrub Meadow MARSH (lsmM; often grading into Thicket SWAMP).

......Meadow (m)
(....Low Shrub Meadow lsm)

1. Emergent vegetation in or adjacent to open shallow water, pools or channels; commonly interspersed or dominated by clumps of vegetation (rooted, or unconsolidated and floating) with open water channels between, or with open water beneath the canopy of sedges, grasses, reeds or cattails; cover by emergents or shrubs greater than 25 percent. (In airphoto interpretation, the following classes of MARSH may not be readily distinguishable. In such cases where ground data are unavailable for referencing wetland types, a generic term such as Emergent MARSH (eM) should be used in mapping from airphotos).

.... Emergent (e)

2. Sedges, grasses, reeds or cattails dominant. Dominant marsh species vary a great deal across Ontario; dominant herbaceous species may include *Calamagrostis canadensis, Typha latifolia, Phalaris arundinacea, Carex aquatilis, C. diandra, C. lacustris, C. pseudo-cyperus, C. stricta, Bidens* spp., *Polygonum natans, Utricularia vulgaris, Lythrum salicaria, Thelypteris palustris*, and many others. May occur on mineral, muck, well-decomposed graminoid peat, or layering of these substrate types.

3. Canopy cover 25 to 75 percent; standing water and/or muck/mud flats beneath canopy or between clumps; characterized by extreme variation in water levels, ranging from water levels at the surface (e.g., after summer water drawdown, or in consolidated cattail MARSH) to standing water up to 2 m deep (e.g., *Scirpus* spp.).

......Deep (d)

3. Canopy 75 to 100 percent; standing water and/or muck/mud flats beneath canopy or between clumps. Characterized by more or less continu-

ous stands of tall emergents (Meadow MARSH would tend to have dominant graminoids of lower stature); with surface water up to 1 m (floodstages), but usually less during much of the summer months.

.......Shallow (s)

2. Sedges, grasses, reeds or cattails present but dominated by shrub species (e.g., *Spiraea alba, Cornus stolonifera, Ilex verticillata, Myrica gale, Decodon verticillatus, Cephalanthus occidentalis*); usually the more or less unconsolidated edges of Thicket or MARSH. A minor physiognomic unit most common in southern Ontario, grading into Thicket SWAMP in many areas; for example, in extreme southwestern Ontario where *Cephalanthus occidentalis* grows much larger.

....Shrub-rich (sr)

MARSH and Meadow MARSH vary considerably in their Dominant species in relation to their proximity to the maritime coast, where they cover extensive areas (refer to Riley and McKay (1980), for James Bay dominance types).

1. MARSH subject to spring and other exceptional tides and consequent marine ice scouring; consistently Meadow MARSH, grading farther away from coastal areas into freshwater MARSH and Meadow MARSH; often broken by supertidal pools with considerably elevated salinity and frequency of haloyphytic plant species.

.....Supertidal (Sup)

1. MARSH subject to regular tidal influence; grading into Supertidal Meadow MARSH, but usually with emergent beachridge deposits or deposits of tidal debris forming some boundary between 'regular' versus 'exceptional' tidal activity; halophytic plant species dominate except in Estuarine areas ameliorated by freshwater input.

....Intertidal (Int)

4. OTHER MODIFIERS

Modifiers reflecting site history can add significantly to the meaning of mapped or reported Physiognomic Groups; modifiers should be placed in brackets after the abbreviation of Physiognomic Group.

Flooded by beaver, roadway or other (e.g., dS(F))	(F)
Cutover and/or recent secondary succession	(C)
Post-fire succession	(P)
Grazed	(G)
Drained, or effected by drains through the area	(D)
Agricultural use	(A)

5. KEYS OR CATALOGUES OF DOMINANCE TYPES

Dominance Types have strong regional characteristics dependent on the distribution of particular plant species across Ontario. These Dominance Types have been categorized for the Northern Clay Belt (Jeglum, Boissonneau and Haavisto 1974) and for the James/Hudson Bay Lowland (Riley 1981), but are available for southern Ontario only through the completed matrices for Maycock's "A preliminary survey of the vegetation of Ontario as a basis for the establishment of a comprehensive Nature Reserve system" (in preparation).

6. SCHEMATIC OF SUBFORMATIONS AND PHYSIOGNOMIC GROUPS AS APPLIED TO WETLAND FORMATIONS IN ONTARIO

SWAMP	S
BOG	B
FEN	F
PALSA/PEAT PLATEAU	PP
MARSH	M
SHALLOW WATER	W
(Poor FEN	PF)

A. SWAMP

Conifer (c)	cS
Deciduous (h)	hS
Mixed (m, or ch,hc,th, etc.	mS, or chS, hcS etc.
Thicket (t)	tS

B. BOG, FEN, PALSA/PEAT PLATEAU

		OPEN(O)	TREED(T)
Shrub-rich	(sr)	OsrB	TsrB
		OsrF	TsrF
Low shrub	(ls)	OlsB	TlsB
		OlsF	TlsF
		OlsPP	TlsPP
Tall shrub	(ts)	OtsB	TtsB
		OtsF	TtsF
Dwarf shrub	(ds)	OdsB	
		OdsPP	
Graminoid	(g)	OgB	TgB
		OgF	TgF
Sphagnum	(sp)	OspB	TspF
Pool	(p)	OpB	
		OpF	
		OlrB	
Lichen-rich	(lr)	Olrls or dsB	TlrlsB
		Olrls or dsPP	TlrlsPP
		OlrPP	

C. MARSH

		(Freshwater)	Coastal (C)	Estuarine (E)
Meadow	(m)	mM	CmM	EmM
Low shrub	(ls)		ClsmM	ElsmM
Emergent	(e)	eM		
Deep	(d)	dM		
Shallow	(s)	sM		
Shrub-rich	(sr)	srM		
Supertidal	(Sup)		CSupmM	ESupmM
Intertidal	(Int)		CIntM	EIntM

7. COMMON NAMES OF PLANT SPECIES FREQUENT ON ONTARIO PEATLANDS/WETLANDS

TREE SPECIES

Abies balsamea	Balsam fir
Acer rubrum	Red maple
Acer saccharinum	Silver maple
Betula papyrifera	White birch
Carya spp.	Hickory species
Fraxinus nigra	Black ash
F. pennsylvanica	Red ash
Larix laricina	Tamarack
Nyssa sylvatica	Black gum
Picea glauca	White spruce
Picea mariana	Black spruce
Pinus strobus	White pine
Populus balsamifera	Balsam poplar
Populus spp.	Poplar, aspen species
Quercus macrocarpa	Bur oak
Quercus palustris	Pin oak
Salix nigra	Black willow
Thuja occidentalis	White cedar
Ulmus americana	American elm

SHRUB SPECIES

Alnus rugosa	Speckled alder
Andromeda glaucophylla	Bog rosemary
Andromeda polifolia	Northern rosemary
Aronia melanocarpa	Chokeberry
Betula pumila var. *glandulifera*	Dwarf birch
Cephalanthus occidentalis	Button bush
Chamaedaphne calyculata	Leatherleaf
Cornus racemosa	Racemose dogwood
Cornus stolonifera	Red osier
Decodon verticillatus	Water willow
Gaylussacia baccata	Black huckleberry
Ilex verticillata	Winterberry
Kalmia angustifolia	Sheep laurel
Kalmia polifolia	Bog laurel
Ledum groenlandicum	Labrador tea
Lonicera oblongifolia	Swamp fly-honeysuckle
Lonicera villosa	Northern honeysuckle
Myrica gale	Sweet gale
Nemopanthus mucronata	Mountain holly
Potentilla fruticosa	Shrubby cinquefoil
Rhamnus alnifolius	Alder-leaf buckthorn
Rhamnus frangula	Alder buckthorn
Rhus radicans	Poison ivy
Rhus vernix	Poinson sumac
Salix bebbiana	Long-beaked willow
Salix discolor	Pussy willow
Salix pedicellaris	Fen willow
Salix petiolaris	Willow
Salix planifolia	Flat-leaf willow
Salix pyrifolia	Balsam willow
Salix serissima	Autumn willow
Salix spp.	Willow

Spiraea alba	White meadowsweet
Spiraea tomentosa	Hardtack
Vaccinium angustifolium	Low sweet blueberry
Vaccinium corymbosum	High-bush blueberry
Vaccinium myrtilloides	Velvet-leaf blueberry
Viburnum cassinoides	Witherod

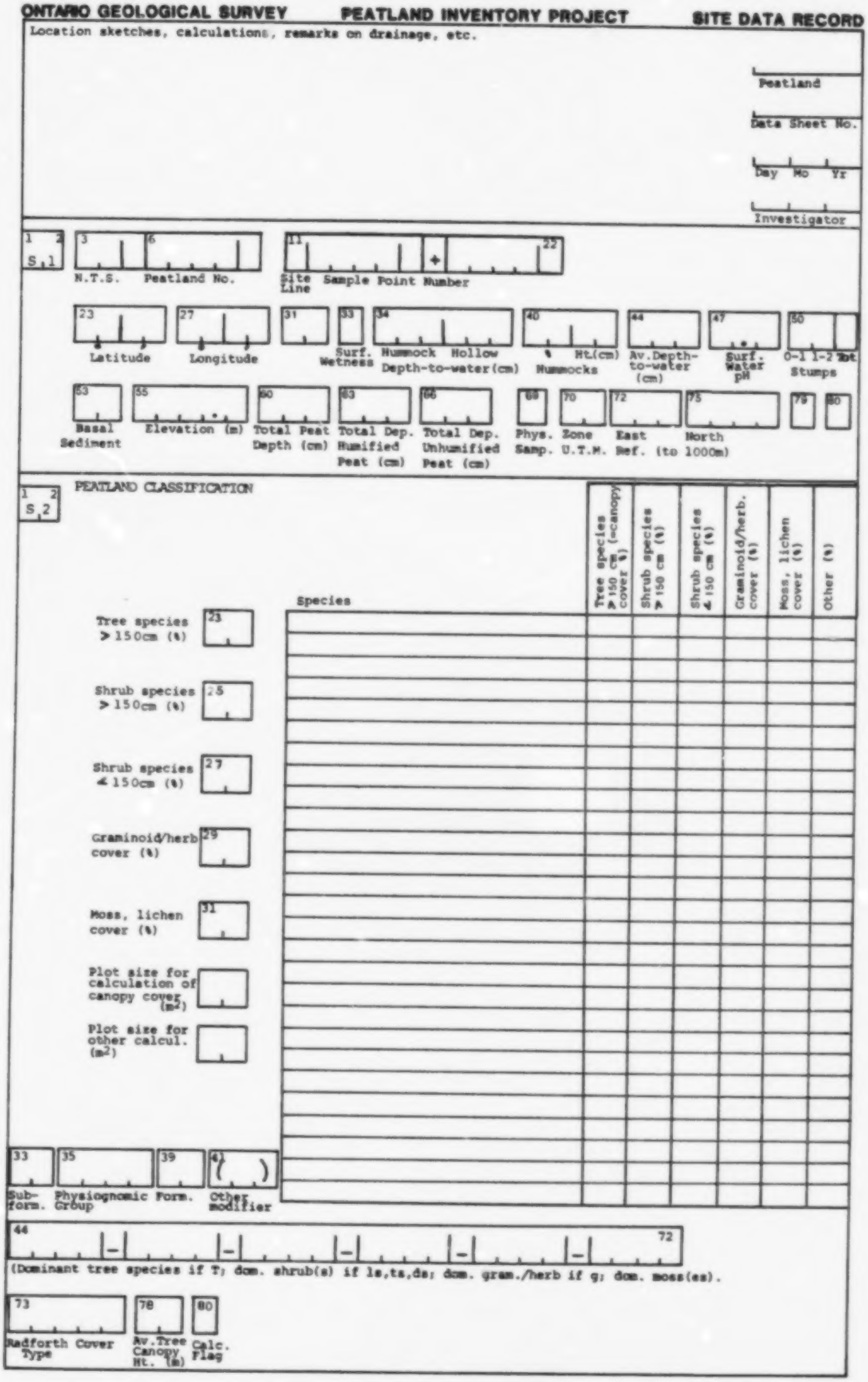
HERB, GRAMINOID AND SUB-SHRUB SPECIES

Bidens spp.	Beggar's-ticks species
Boehmeria cylindrica	Bog hemp
Calamagrostis canadensis	Blue-joint grass
Calla palustris	Wild calla
Carex aquatilis	Sedge
Carex canescens	Sedge
Carex chordorrhiza	Sedge
Carex comosa	Sedge
Carex diandra	Sedge
Carex exilis	Sedge
Carex flava	Sedge
Carex interior	Sedge
Carex lacustris	Sedge
Carex lasiocarpa	Sedge
Carex leptalea	Sedge
Carex limosa	Sedge
Carex livida	Sedge
Carex michauxiana	Sedge
Carex microglochin	Sedge
Carex oligosperma	Sedge
Carex pauciflora	Sedge
Carex paupercula	Sedge
Carex pseudo-cyperus	Sedge
Carex rostrata	Sedge
Carex trisperma	Sedge
Carex vesicaria	Sedge
Cladium marisoides	Twig rush
Drosera anglica	Northern sundew
Drosera rotundifolia	Round-leaved sundew
Dulicheum arundinaceum	Tree-way sedge
Eleocharis elliptica	Spike rush
Eleocharis palustris	Spike rush
Equisetum fluviatile	Water horsetail
Eriophorum spissum	Hare's-tail cottongrass
Eriophorum virginicum	Tawny cottongrass
Eriophorum viridicarinatum	Cottongrass
Eupatorium maculatum	Joe Pye weed
Galium trifidum	Bedstraw
Gaultheria hispidula	Creeping snowberry
Glyceria borealis	Manna grass
Hydrocharis morus-ranae	Frog's-bit
Impatiens capensis	Spotted touch-me-not
Iris versicolor	Blue flag
Laportea canadensis	Wood nettle
Leersia oryzoides	Cut-grass
Lemna minor	Duckweed
Lycopodium inundatum	Bog clubmoss
Lycopus uniflorus	Water horehound
Lythrum salicaria	Spiked loosestrife
Matteuccia struthiopteris	Ostrich fern
Menyanthes trifoliata	Buckbean

Muhlenbergia glomerata	Muhly grass
Onoclea sensibilis	Sensitive fern
Osmunda regalis	Royal fern
Phalaris arundinacea	Reed canary grass
Phragmites communis	Reed
Platanthera hyperborea	Northern green orchis
Polygonum natans	Water smartweed
Pontederia cordata	Pickerelweed
Potentilla palustris	Marsh cinquefoil
Rhynchospora alba	Beak-rush
Rubus acaulis	Stemless raspberry
Rubus chamaemorus	Baked appleberry
Rubus pubescens	Dwarf raspberry
Sagittaria latifolia	Water plantain
Sarracenia purpurea	Pitcher plant
Scheuchzeria palustris	Scheuchzeria
Scirpus acutus	Bulrush
Scirpus cespitosus	Bulrush
Scirpus cyperinus	Bulrush
Scirpus hudsonianus	Bulrush
Scirpus rubrotinctus	Bulrush
Scirpus validus	Bulrush
Smilacina trifolia	False solomon's seal
Solanum dulcamara	Nightshade
Solidago uliginosa	Fen goldenrod
Thelypteris palustris	Marsh fern
Triglochin maritimum	Arrow-grass
Typha latifolia	Cat-tail
Utricularia cornuta	Bladderwort
Utricularia vulgaris	Bladderwort
Vaccinium macrocarpon	Large cranberry
Vaccinium oxycoccus	Small cranberry
Woodwardia virginica	Chain fern
Xyris difformis	Yellow-eyed grass
Xyris montana	Yellow-eyed grass
Zizania aquatica	Wild rice

MOSS AND LICHEN SPECIES

Aulocomnium palustris	Brown moss
Bryum pseudotriquetrum	Brown moss
Caliergon giganteum	Brown moss
Calliergonella cuspidata	Brown moss
Campyllium stellatum	Brown moss
Cladina spp.	Lichen
Climacium dendroides	Brown moss
Dicranum undulatum	Brown moss
Drepanocladus exannulatus	Brown moss
Drepanocladus revolvens	Brown moss
Hylocomium splendens	Brown moss
Hypnum lindbergii	Brown moss
Paludella squarrosa	Brown moss
Pleurozium schreberi	Feather moss
Polytrichum spp.	Hair-cap moss species
Scorpidium scorpioides	Brown moss
Sphagnum spp.	Sphagnum species
Tomenthypnum nitens	Brown moss



ONTARIO GEOLOGICAL SURVEY **PEATLAND INVENTORY PROJECT** **SITE DATA RECORD**

Location sketches, calculations, remarks on drainage, etc.

Peatland

Data Sheet No.

Day Mo Yr

Investigator

1 2 S 1

3 N.T.S. 6 Peatland No.

11 Site Line Sample Point Number + 22

23 Latitude

27 Longitude

31

33 Surf. Wetness

34 Hummock Hollow Depth-to-water (cm)

40 % Ht.(cm) Hummocks

44 Av. Depth-to-water (cm)

47 Surf. Water pH

50 0-1 1-2 Tot Stumps

53 Basal Sediment

55 Elevation (m)

60 Total Peat Depth (cm)

63 Total Dep. Humified Peat (cm)

66 Total Dep. Unhumified Peat (cm)

69 Phys. Samp.

70 Zone U.T.M.

72 East Ref. (to 1000m)

75 North

79

80

1 2 S 2

PEATLAND CLASSIFICATION

Tree species > 150cm (%) 23

Shrub species > 150cm (%) 25

Shrub species ≤ 150cm (%) 27

Graminoid/herb cover (%) 29

Moss, lichen cover (%) 31

Plot size for calculation of canopy cover (m²)

Plot size for other calcul. (m²)

Species	Tree species > 150 cm (=canopy cover %)	Shrub species > 150 cm (%)	Shrub species ≤ 150 cm (%)	Graminoid/herb. cover (%)	Moss, lichen cover (%)	Other (%)

33 Sub-form.

35 Physiognomic Group

39 Form.

41 ( ) Other modifier

44 – – – – – 72

(Dominant tree species if T; dom. shrub(s) if ls,ts,ds; dom. gram./herb if g; dom. moss(es).

73 Radforth Cover Type

78 Av. Tree Canopy Ht. (m)

80 Calc. Flag

PEAT STRATIGRAPHY

	Depth (cm)		Peat Type			Other	H	B	F	Rel	Interval remarks, minor types, seeds, charcoal, etc.
	from	to	Subdom.%	Subdom.%	Domin. %	Type %	1-10	1-5	0-3	Dep	
1 2	23	26	29	32	35	38	41	42	43	44	45
C 1											
C 2											
C 3											
C 4											
C 5											
C 6											
C 7											
C 8											
C 9											
C 0											
D 1											
D 2											
D 3											
D 4											
D 5											
D 6											
D 7											
D 8											
D 9											
D 0											
E 1											
E 2											

CODES

Peatland Classification

Formations:

Swamp	S
Bog	B
Fen	F
Palsa/Peat Plateau	PP
Marsh	M
Open Water	W
(Poor Fen	PF)

Subformations:

Open	O
Treed	T

Physiognomic Groups:

B,F,	Tall shrub	ts
PF,PP	Low shrub	ls
	Dwarf shrub	ds
	Graminoid	g
	Sphagnum	sp
	Pool	p
	Lichen-rich	lr
S	Conifer	c
	Deciduous	h
	Thicket	t
M	Meadow	m
	Lowshrub	ls
	Deep	d
	Shallow	s
	Shrub-rich	sr
(U	Upland)	

Peat Types

Mosses	S
Sphagnum	S_s
Brown moss	S_b
Sedge/graminoid	C
Wood	L
Shrub	L_n
Tree	L_1

Minor Types-Refer Guidelines

Ooze	OZ
Marl	MA

Surface Wetness

Dry	1
Moist	2
Wet	3
Very wet	4
Water above surface	5

Other Modifiers

Flooded	(F)
Cutover	(C)
Post-fire	(F)
Grazed	(G)
Drained	(D)

Radforth Cover Classes

A. Woody; 5m, tree form.
B. Woody; 1.5 to 5m, trees or shrubs.
C. Non-woody; .5 to 1.5m, graminoid/herb.
D. Woody; .5 to 1.5m, shrubs or dwarf trees.
E. Woody, .5m, low shrubs.
F. Non-woody, .5m, gram/herbs clumped or matted.
G. Non-woody, .5m, gram/herbs singly or loose.
H. Non-woody, .1m, lichens.
I. Non woody, .1m, mosses.

Sample Wetness

Dry	1
Moist	2
Wet (average)	3
Very wet	4
Saturated	5

Fiber

Amorphous/ Sapric	0
Sapric	1
Hemic	2
Fibric	3

Sediment

Rock	RO
Gravel	GR
Sand	SA
Silt	SI
Clay	CL
Till	TI

REFERENCES CITED IN APPENDIX C

Ahti, T. and Hepburn, R.L. 1967. Preliminary studies on woodland caribou range, especially on lichen stands in Ontario; Ontario Department of Lands and Forests, Research Report (Wildlife) no.74, 134p.

Jeglum, J.K. and Boissonneau, A.N. 1977. Air photo interpretation of wetlands, Northern Clay Section, Ontario; Canadian Forestry Service, Sault Ste. Marie, Information Report O-X-269, 44p.

Jeglum, J.K., Boissonneau, A.N. and Haavisto, V.F. 1974. Toward a wetland classification for Ontario; Canadian Forestry Service, Sault Ste. Marie, Information Report O-X-215, 54p.

Jones, R.K., Pierpoint, G., Wickware, G.M., Jeglum, J.K., Arnup, R.W. and Bowles, J.M. 1983. Field guide to forest ecosystem classification for the Clay Belt, site region 3E; Ontario Ministry of Natural Resources, Queen's Printer for Ontario, 123p.

Maycock, P. In Prep. A preliminary survey of the vegetation of Ontario as a basis for the establishment of a comprehensive Nature Reserve system; Ontario Ministry of Natural Resources, Parks Planning Branch.

Riley, J.L. 1981. Provisional wetland classification for the Hudson Bay Lowland and the major regional themes; Parks and Recreation Section, Northern Region, Ontario Ministry of Natural Resources, Cochrane, 72p. Unpublished.

Riley, J.L. and McKay, S.M. 1980. The vegetation and phytogeography of coastal southwestern James Bay; Royal Ontario Museum, Life Science Contribution no.124, 81p.

Schwintzer, C.R. 1978. Vegetation and nutrient status of northern Michigan fens; Canadian Journal of Botany, v.56, p.3044-3051.

—— 1981. Vegetation and nutrient status of northern Michigan bogs and conifer swamps with a comparison to fens; Canadian Journal of Botany, v.59, p.842-853.

Tarnocai, C. 1979. Canadian wetland registry; *in* Proceedings of a Workshop in Canadian Wetlands, Environment Canada, Lands Directorate, Ecological Land Classification Series, no.12, p.9-38.

Vitt, D.H. and Slack, N.G. 1975. An analysis of the vegetation of Sphagnum-dominated kettle-hole bogs in relation to environmental gradients; Canadian Journal of Botany, v.53, p.332-359.

Zoltai, S.C., Pollett, F.C., Jeglum, J.K. and Adams, G.D. 1973. Developing a wetland classification for Canada; *in* Proceedings of the 4th North American Forest Soils Conference, p.497-511.

Appendix D. Index Maps for Study Areas in Northwestern Ontario (in back pocket)

A. Rainy River
B. Dryden–Lac Seul
C. Sioux Lookout
D. Ignace
E. Armstrong
F. Longlac–Nakina

Appendix E. Species Composition of Peatland Vegetation Types, Northwestern Ontario

APPENDIX E. SPECIES COMPOSITION OF PEATLAND VEGETATION TYPES, NORTHWESTERN ONTARIO.

Figures are mean percentage cover values (light interception), and bracketted figures are percentage frequencies of occurrence. Cover values less than 0.5 percent are indicated by plus (+) signs; for species with cover values less than 0.5 percent, frequencies of 20 percent or less (or only reflecting single site occurrences) are not presented.

Codings of peatland types:
tS - thicket swamp
cS - conifer swamp
OpF - open fen pools
OgF - open graminoid fen
OlsF - open low shrub fen

OTSF - open tall shrub fen
OPF - oprn poor fen
TgF - treed graminoid fen
TlsF - treed low shrub fen
TtsF - treed tall shrub fen

TpF - treed poor fen
OgB - open graminoid bog
OdsB - open dwarf shrub bog
OlsB - open low shrub bog
TgB - treed graminoid bog
TlsB - treed low shrub bog

PEATLAND TYPES	Marsh	Swamp		FEN								BOG					
No. of Sample Sites	M 5	tS 6	cS 9	OpF 6	OgF 29	OlsF 11	OtsF 1	OPF 3	TgF 5	TlsF 8	TtsF 3	TpF 3	OgB 33	OdsB 9	OlsB 12	TgB 7	TlsB 15
TREE SPECIES																	
Abies balsamea		+	2(22)											+			
Betula papyrifera		+(33)	+											+(22)			
Fraxinus nigra		+															
Larix laricina	+	1(67)	9(44)		2(93)	3(91)		2(67)	12(100)	7(87)	16(100)	7(100)	1(88)	+(67)	1(67)	2(57)	+(33)
Picea mariana	1(20)	4(67)	31(100)		1(59)	2(73)		1(67)	+(40)	10(100)	11(67)	5(100)	4(94)	4(100)	6(92)	14(100)	19(100)
Pirus banksiana		+			+									+		+	
P. strobus														+			
Populus balsamifera			+(22)											+(22)	+		
P. tremuloides		1(33)	+(22)					+									
Thuja occidentalis		1(50)	10(33)		+	+			+								
SHRUB SPECIES																	
Alnus rugosa	1(80)	18(100)	8(78)		+	+			+	+(25)	+			+(22)			
Andromeda glaucophylla	1(40)	+	2(56)	+(50)	2(93)	14(100)	2	15(67)	1(80)	4(75)	3(100)	2(100)	1(55)	3(56)	1(58)	1(57)	+(40)
Aronia melanocarpa					+	+											
Betula pumila var. glandulifera	8(60)	4(67)	3(44)		3(90)	12(100)	40	9(100)	6(100)	7(87)	27(100)	5(100)	1(39)	+(22)	1(17)	1(43)	+(27)
Chamaedaphne calyculata	2(60)	2(67)	5(67)		3(76)	6(91)	30	5(100)	6(100)	8(100)	8(100)	8(100)	10(100)	24(100)	32(100)	9(100)	18(93)
Cornus stolonifera	+	10(67)	+			+											
Juniperus communis											+						
J. horizontalis					+	+				1(13)	+						
Kalmia polifolia	+		2(45)	+	+(45)	1(46)		1(63)	1(60)	+(50)	+	3(100)	3(94)	8(100)	3(100)	2(86)	6(93)
Ledum groenlandicum	+(40)	8(83)	13(100)		+(21)	1(55)		+(67)	+	4(75)	2(67)	+	1(42)	3(78)	3(83)	3(86)	10(100)
Lonicera canadenis		+															
L. hirsuta									+								
L. oblongifolia		4(17)		+	+	+											
L. villosa		1(50)	+		+	1(46)				+(25)							
Myrica gale	2(20)	8(17)			+	2(9)	3										
Nemopanthus mucronatus	+																
Potentilla fruticosa					+	3(27)				+							
Prunus pensylvanica		+															
P. pumila var. cuneata					+												
Rhamnus alnifolia		5(50)			+(21)	+(27)			+	+							
Ribes hirtellum		+(50)															
Rosa acicularis										+							

Rubus strigosus	+(60)	1(83)	+														
Salix bebbiana								+							+		
S. candida						+				+							
S. discolor	2(60)	+	1(22)			+											
S. pedicellaris	1(60)	+	1(33)		1(35)	2(73)		+(67)	1(60)	1(38)	8(100)	+					+
S. petiolaris						+		+									
S. planifolia	+(60)	2(17)															
S. pyrifolia		3(33)															
S. serissima		4(17)				1(9)											
Sorbus americana	+		+														
S. decora		+															
Spiraea alba	+				+		+										
Vaccinium angustifolium	+	+						+(67)	+					+	+	+	+
V. myrtilloides		1(50)	+(33)					+	+				+	+(22)			+
HERB,GRAMINOID, SUB-SHRUB SPECIES																	
Agrostis scabra					+	+											
Anemone quinquefolia										+(25)							
Arethusa bulbosa					+(38)	+			+	+(38)							
Asclepias incarnata		+															
Aster borealis	+	1(50)			+(21)	+											
A. ciliolatus			+			+				+							
A. lanceolatus	+																
A. puniceus		+(67)															
A. umbellatus	+(40)	1(50)			+												
Athyrium filix-femina	2(40)	+(33)	+			+											
Botrychium virginianum						+				+							
Calamagrostis canadensis	22(100)	4(83)	1(44)		+	+(46)			+	+(38)	1(33)						+
C. stricta					+												
Calla palustris		+															
Calopogon tuberosus					+												
Caltha palustris	+	+(33)	+			+(27)			+		+						
Campanula uliginosa	1(20)				+				+								
Carex aquatilis					+	+	10			1(13)	1(67)						+
C. brunnescens		1(17)															
C. chordorrhiza		1(17)	1(22)	4(50)	2(62)	1(46)		3(67)	1(60)	2(63)	2(100)	2(100)	+			1(14)	1(27)
C. diandra					+	+			+	1(38)							
C. disperma		2(67)	1(33)							+(25)	+						
C. exilis				1(17)	1(20)				+				+				
C. gynocrates					+	+	+			1(38)	+						
C. interior					+(28)	+(27)				1(50)							
C. intumescens		2(17)															
C. lacustris	4(20)																
C. lasiocarpa	11(40)			2(50)	12(83)	4(73)		3(67)	25(80)	1(25)	+	16(67)					
C. leptalea	1(20)	8(83)	+(22)		+(35)	+(46)	+			+(25)	+(67)						+
C. limosa	+	+		6(67)	4(76)	1(46)		+(33)	7(80)	3(63)		3(67)	2(24)		+(42)	1(14)	+
C. livida				2(83)	2(52)	+				+							
C. michauxiana				+	+												
C. oligosperma		+	+	2(67)	1(21)	1(18)		15(33)			1(33)	1(33)	27(97)	4(78)	3(83)	18(100)	1(40)
C. pauciflora			1(33)		+	+		+					1(76)	+(33)	1(83)	1(71)	1(53)
C. paupercula	+(40)	+(33)	+(22)	+	+	1(36)		7(67)	+(40)	2(87)	1(67)		+		+		
C. rostrata	4(40)	3(50)			+										+		
C. stricta	+									+(25)							

APPENDIX E. CONTINUED.

C. tenuiflora					+			+		+(25)							+
C. trisperma		+(50)	3(44)							+							1(27)
Cicuta bulbifera	+	+			+				+								
Cladium mariscoides				4(33)	2(7)												
Clintonia borealis		+	+(33)							+							
Comandra livida						+				+(38)			+			+	
Coptis groenlandica			1(22)			+				+(25)							
Corallorhiza trifida											+						
Cornus canadensis	1(20)	2(67)	3(44)			+				1(25)	+						
Drosera anglica				+(50)	+(38)												
D. intermedia				+	+												
D. linearis				+	+												
D. rotundifolia	+			+(50)	+(76)	+(46)			+(60)	+(50)		+(67)	+(27)	+(22)	+(33)	+	+(33)
Dryopteris cristata		+(67)	+		+					+							
Eleocharis elliptica				+(33)	+(45)	+					+						
Epilobium leptophyllum	+									+							
E. palustre			+		+	+					+(67)						
Equisetum fluviatile		1(33)	+(44)	1(67)	1(76)	1(73)		+(67)	2(40)	2(75)	4(100)	+					
E. palustre					+	+				+(38)							
E. scirpoides										+							
E. sylvaticum		+(33)															
E. variegatum						+				+							
Eriocaulon septangulare				+(33)													
Eriophorum gracile					+	+		+	+			+	+				
E. russeolum var. albidum						+											
E. spissum		+	+(22)		+	+			+(40)				2(88)	3(100)	3(92)	2(100)	2(87)
E. tenellum		+		+(33)	+	+							+				
E. virginicum	+																
E. viridicarinatum		+	+(44)		+(31)	+(27)		+	+	+(38)							
Eupatorium maculatum	+																
Fragaria virginiana										+	+						
Galium labradoricum			+		+(24)	+(27)	+		+	+							
G. palustre		1(50)															
G. trifidum	+	1(50)	+(22)			+					+						
G. triflorum	+		+														
Gaultheria hispidula	+	1(33)	1(78)		+	+				+(38)	2(33)		+	+	+	+(43)	+
Glyceria canadensis	+																
G. grandis	+	+															
Impatiens capensis	+	+															
Iris versicolor	+(40)	+(33)	+(22)		+	+(27)			+	+	+(67)						
Juncus brevicaudatus				+													
J. canadensis					+												
J. stygius var. americana				+(33)	+								+				
Linnaea borealis		+	+(22)		+	+				1(25)	+						
Liparis loeselii					+												
Listera cordata										+							
Lobelia kalmii				+	+	+											
Lycopodium annotinum		+	+(22)														
L. inundatum				+													
Lycopus uniflorus	+(60)	+(33)	+														
Lysimachia terrestris	+				+												
L. thyrsiflora	+	+		+	+												
Melanthemum canadense		+	+		+												

Melampyrum lineare				+	+					+			+				+
Menyanthes trifoliata	+		1(33)	3(100)	4(86)	+(46)		+	1(60)	3(75)		1(67)					+
Mimulus ringens	+																
Mitella nuda			+			+				+(25)	3(33)						
Moneses uniflora										+							
Monotropa uniflora				+						+		+					
Muhlenbergia glomerata	2(40)				+(28)	+(36)		1(33)	+						+		
Orchis rotundifolia										+							
Osmunda cinnamomea	+																
Parnassia glauca					+												
P. palustris						+											
Pedicularis lanceolata					+												
Petasites palmatus										+							
P. sagittatus	+	1(17)															
Phragmites communis	+(40)	1(17)			+	+.											
Platanthera clavellata					+												
P. dilatata					+(21)	+				+(25)							
P. hyperborea			+		+	+(27)	+		+(40)	+(25)	+						
P. lacera					+(38)	+				+							
Pogonia ophioglossoides				+(33)	+(38)					+							
Polygala paucifolia						+											
Potentilla palustris	1(100)	+(33)	+(22)		+	+(55)	+		+(40)	+(50)	+(67)						+
Pyrola asarifolia						+				+							
P. minor			+							+(25)							
Rhynchospora alba				8(100)	1(38)								+				
R. capillacea					+												
R. fusca				2(33)	+												
Rubus acaulis	+(60)	1(50)	1(22)		+(28)	+(46)			+	+	+						
R. chamaemorus			+(33)		+	+				+	+		+		+		+
R. pubescens		3(100)	1(22)		+	+(46)				+(25)	+						
Sanguinaria canadensis		+															
Sanicula marilandica		+															
Sarracenia purpurea			+(22)	+(33)	+(97)	+(46)		+	+(100)	+(50)	+(67)	+(67)	+(76)	+(33)	+(42)	+(57)	+(60)
Scheuchzeria palustris				1(33)	1(52)	+			1(40)	+		2(67)	2(64)	1(22)	1(42)	2(43)	1(27)
Scirpus cespitosus				2(50)	9(66)	3(27)				+(25)	+						
S. cyperinus		3(20)	+														
S. hudsonianus				+	3(48)	+(27)		+		+(38)		2(33)					
Selaginella selaginoides				+	+	+			+								
Sium suave	+																
Smilacina trifolia	+	+(50)	1(67)		+(21)	1(64)	6	+	1(60)	1(75)	3(100)	4(67)	+	3(22)	1(17)	+	3(73)
Solidago canadensis	+	3(33)															
S. uliginosa		+	+	+	+(35)	+(55)		+		+(25)	+						
Spiranthes romanzoffiana					+					+							
Stellaria longifolia							+				+						
Thalictrum dasycarpum					+												
Thelypteris palustris	+(40)				+	+			1(20)								
Tofieldia glutinosa				+	+	+											
Triadenum fraseri		+															
Trientalis borealis		+	+(33)					+									
Triglochin maritimum		+			+(35)	+(27)				+							
T. palustris					+												
Typha latifolia	+(80)					+		+	+								

APPENDIX E. CONTINUED.

Utricularia cornuta				+(67)		+											
U. intermedia	+(40)			+(83)	+(72)	+		+	+(40)	+							
U. minor				+(33)	+(48)	+			+	+							
U. vulgaris					+												
Vaccinium oxycocus	+	+(83)	1(78)		+(79)	1(91)	+	1(67)	+(100)	1(100)	1(67)	1(67)	1(97)	3(89)	1(92)	1(100)	1(93)
V. vitis-idaea		+	+(22)							+	2(33)			+	+		+
Veronica scutellata		+															
Viola incognita										+							
V. pallens		+	+	+	+	+				+							
Xyris montana				+(67)													
BRYOPHYTE SPECIES																	
Aulocomnium palustre	+			+	1(24)	3(82)	9	1(67)	2(80)	4(87)	2(33)	+	1(21)	+		+	+
Calliergon cordifolium		2(17)				2(9)											
C. giganteum					+						1(33)						
C. stramineum										+							
Campylium stellatum				3(17)	6(38)	7(36)			2(20)	4(25)							
Cladopodiella fluitans					+	+				1(13)							+
Dicranum ontariense																	+
D. polysetum	1(20)		1(11)														+
D. undulatum					+					+(50)	+		+	+		+	+(27)
Drepanocladus exannulatus						1(18)		1(33)		1(13)							
D. revolvens					+	2(18)					+						
D. uncinatus			1(11)														
D. vernicosus					+					1(13)							
Hylocomium splendens			2(11)							+(25)							
Hypnum lindbergii	11(40)					4(9)											
Mylia anomala																	
Paludella squarrosa						+				+							+
Pleurozium schreberi	+	14(33)	5(44)		+	8(55)				15(87)	11(67)	+	+	2(11)	+	+	9(53)
Polytrichum commune																+(29)	
P. strictum		3(17)	+	+(33)	+(69)	+		1(33)	+(60)	+(25)		+	1(70)	1(100)	+(58)	+(29)	+(33)
Ptilium cristacastrensis			1(11)							+							
Rhytiadelphus triquetrus	4(20)																
Scapania irrigua										+							
S. paludicola						+											
Scorpidium scorpioides				13(60)	4(17)	+											
Sphagnum annulatum					2(10)												
S. augustifolium		20(50)	18(56)		9(48)	30(55)	20	20(67)	15(40)	13(63)	53(100)	10(67)	28(67)	18(78)	33(92)	29(57)	36(87)
S. centrale			1(11)		1(3)			25(67)	8(20)			7(33)					
S. cuspidatum			+														
S. fallax		4(17)	9(22)	3(17)	10(35)	+			10(40)	16(38)		53(100)	19(39)	1(22)	2(8)	42(57)	4(13)
S. fuscum	2(20)		7(56)		7(69)	1(46)		13(67)	12(80)	9(50)	+	13(67)	16(79)	58(100)	48(92)	10(71)	31(67)
S. girgensohnii			2(11)														
S. magellanicum	14(20)	3(17)	20(78)	16(60)	16(62)	8(73)	5	13(67)	14(60)	15(63)	15(33)	9(67)	10(70)	8(56)	6(75)	19(86)	15(93)
S. majus				3(17)	+								2(6)		+		
S. nemoreum		10(17)	9(44)	+	5(17)	11(56)		20(33)	15(20)	5(25)			14(24)	7(22)	3(25)		1(7)
S. papillosum					+								6(18)			1(14)	1(7)
S. pulchrum					1(7)												
S. rubellum					4(35)	+			2(40)	1(13)	7(33)	4(33)	3(30)	3(33)	9(42)	1(14)	
S. russowii			1(22)							2(13)							
S. squarrosum			8(22)														

S. subfulvum					1(3)												
S. subsecundum			+(22)	+	2(28)	+			4(40)	1(13)			+				
S. warnstorfii		7(17)			+		65						+				
S. wulfianum		4(17)	9(33)														
Thuidium recognitum						2(9)											
Tomenthypnum nitens					3(21)	5(27)			+	1(25)							
LICHEN SPECIES																	
Cladonia cristatella						+				+							
C. mitis						+				+				+(22)	+		+(33)
C. rangiferina	+					+				+(25)				+			+
Ichmadophila ericetorum														+(22)			+
Peltigera apthosa										+							

9.0 References

Adamson, A. 1975. Crop production of peat-vegetables; *in* Peat in Horticulture, Academic Press, p.97-109.

ADI Ltd. 1982. Report on a study of the biogasification of peat; National Research Council of Canada under the auspices of the Peat Forum, NRCC 20600, 57p.

Andre Marsan et Associes Inc. 1980. Industrial uses of peat in northeastern New Brunswick; Department of Commerce and Development, Province of New Brunswick.

Andrejko, M.J., Fiene, F. and Cohen, A.D. 1983. Comparison of ashing techniques for determination of the inorganic content of peats; *in* Testing of Peats and Organic Soils, American Society for Testing and Materials, STP 820, p.5-20.

Anrep, A.V. 1914. Investigation of the peat bogs and peat industry of Canada 1911-12; Canada Department of Mines, Mines Branch, Bulletin no.9. (Accompanying peatland maps published later by the Geological Survey of Canada as GSC Maps 1875-79, 1884-87, 1889-91; sometimes referred to as Anrep 1920.)

APEO (Association of Professional Engineers of the Province of Ontario) 1976. Performance standards for Professional Engineers advising on and reporting on oil, gas and mineral properties; Toronto.

Arafat, N.M. and Glooschenko, W.A. 1981. Method for the simultaneous determination of arsenic, aluminum, iron, zinc, chromium and copper in plant tissue without the use of perchloric acid; Analyst, v.106, p.1174-1178.

Asmussen, D. 1983. The environmental regulation of peatland development in Minnesota; *in* International Symposium on Peat Utilization, Bimidji State University, p.535-543.

ASTM (American Society for Testing and Materials) 1981. Annual Book of ASTM Standards, Part 19, Soil and Rock, Building Stones; Philadelphia, 650p. (ASTM D2607, D2944.)

Auer, V. 1930. Peat bogs in southeastern Canada; Canada Department of Mines, Geological Survey, Memoir 162, 32p.

Bardecki, M.J. 1984. What value wetlands?; Journal of Soil and Water Conservation (May-June), p.166-169.

Bardecki, M.J. and Patterson, N. eds. 1989. Wetlands: inertia or momentum, proceedings of a conference; Federation of Ontario Naturalists, Don Mills, Ontario.

Berggern, B., Kalmari, A. and Leino, P. 1980. Classification and properties of peat and fuel purposes; EKONO Oy, Helsinki, Finland, 30p.

Bertulli, J.A. 1981. Influence of a forested wetland on a Southern Ontario watershed; *in* Proceedings of the Ontario Wetlands Conference, Federation of Ontario Naturalists, p.33-47.

Bjorck, S. 1985. Deglaciation chronology and revegetation in northwestern Ontario; Canadian Journal of Earth Sciences, v.22, p.850-871.

Blackburn, C.E. 1981. Kenora-Fort Frances, Kenora and Rainy River districts; Ontario Geological Survey, Map 2443, scale 1:253 440.

Blackburn, C.E., Bond, W.D., Breaks, F.W., Davies, D.W., Edwards, G.R., Poulsen, K.H., Trowell, N.F. and Wood, J. 1985. Evolution of Archean volcanic-sedimentary sequences of the western Wabigoon Subprovince and its margin: a review; *in* Evolution of Archean Supracrustal Sequences, Geological Association of Canada, Special Paper 28, p.89-116.

Boodley, J.W. 1982. An overview of the horticultural peat industry in the USA; *in* Symposium 82, A Symposium on Peat and Peatlands, Canadian National Committee of the International Peat Society, p.12-25.

Bostock, N.S. 1970. Physiographic subdivisions of Canada; *in* Geology and Economic Minerals of Canada, Geological Survey of Canada, Economic Geology Report no.1, p.10-30.

Boville, B.W., Munn, R.E. and Hare, F.K. 1982. The storage of non-living organic carbon in boreal and arctic zones—Canada, final report; Contract no.DE-AS01-81EV-10688, United States Department of Energy, 89p.

Boyle, R.W. 1977. Cupriferous bogs in the Sackville area, New Brunswick, Canada; Canadian Journal of Geochemical Exploration, v.8, p.2755-2759.

Breaks, F.W. and assistants 1980. Sioux Lookout-Armstrong, Kenora and Thunder Bay districts; Ontario Geological Survey, Map 2442, scale 1:253 440.

Brenninkmeyer, B.M. and Russo, J.S. 1984. Peat resource definition and utilization in Massachusetts, final report, phase one; Commonwealth of Massachusetts Executive Office of Energy Resource and United States Department of Energy, 176p.

Brown, A.L. 1982. Soil mixes—production and use in the USA; *in* Symposium 82, A Symposium on Peat and Peatlands, Canadian National Committee of the International Peat Society, p.316-323.

Burwash, A.L. and Wiesner, W.R. 1984. Classification of peats for geotechnical engineering purposes; *in* Proceedings: Cold Regions Engineering Specialty Conference, Canadian Society for Civil Engineering, p.979-998.

Cameron, C.C., Mullen, M.K., Lepage, C.A. and Anderson, W.A. 1984. Peat resources of Maine; Maine Geological Survey, Department of Conservation, Bulletins 28 to 32.

Campbell, J.A. 1984. The utilization of peat and soil reconstruction on waster oil sands tailings in Alberta; *in* Proceedings of the Seventh International Congress, International Peat Society, v.3, p.188-206.

Carlson, L.W. 1983. Guidelines for rearing containerized conifer seedlings in the prairie provinces; Canadian Forestry Service, Information Report NOR-X-214E, 64p.

Carlson and Sweatt-Monenco Inc. 1982. State of New York peat resource inventory; New York State Energy Research and Development Authority, 2 volumes.

Carncross, C.A. 1981. New initiatives in the Canadian horticultural peat industry; *in* Proceedings of Symposium on Peat, An Awakening Natural Resource, Ontario Ministries of Energy, Natural Resources and Northern Affairs, and Canadian National Committee of the International Peat Society, p.311-317.

Carpenter, J.M. and Farmer, G.T. 1981. Peat mining—an initial assessment of wetland impacts and measures to mitigate adverse effects; United States Environmental Protection Agency, 61p.

Carter, M.W., McIlwaine, W.H. and Wisbey, P.A. 1973. Nipigon-Schreiber, Thunder Bay District; Ontario Division of Mines, Map 2232, scale 1:253 440.

Carter, V., Bedinger, M.S., Novitzki, R.P. and Wilen, W.O. 1978. Water resources and wetlands; *in* Wetland Functions and Values: The State of Our Understanding, Proceedings of the National Symposium on Wetlands, American Water Resources Association, p.34-376.

Champagne, A. 1981. Proceedings of the Ontario Wetlands Conference; Federation of Ontario Naturalists, 193p.

Chapman, L.J. and Thomas, M.K. 1968. The climate of northern Ontario; Department of Transport, Meteorological Branch, Climatological Studies no.6, 58p.

Chistyakov, V.I., Selennov, V.G. and Simonova, A.A. 1983. Production and application of pressed peat substrate blocks; *in* Recent Technologies in the Use of Peat, E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, p.47-50.

Clarke-Whistler, K. and Rowsell, J.A. 1982. Peatlands as fish and wildlife habitat; *in* Symposium 82, A Symposium on Peat and Peatlands, Canadian National Committee of the International Peat Society, p.170-191.

Clarke-Whistler, K., Snodgrass, W.J., McKee, P. and Rowsell, J.A. 1984. Development of an innovative approach to assess the ecological impact of peatland development; National Research Council of Canada under the auspices of the Peat Forum, NRCC 24129, 204p.

Clausen, J.C. 1979. The potential effects of peat mining; *in* Management Assessment of Peat as an Energy Resource, Proceedings of Executive Conference, Institute of Gas Technology, p.201-203.

Clausen, J.C., Lewis, J.R., Brooks, K.N. and Guertin, D.P. 1980. The quality of waters discharged from Minnesota peatlands; *in* Proceedings of the Sixth International Peat Congress, International Peat Society, p.533-537.

Clayton, L. 1983. Chronology of Lake Agassiz drainage to Lake Superior; *in* Glacial Lake Agassiz, Geological Association of Canada, Special Paper 28, p.291-307.

Clayton, L. and Moran, S.R. 1982. Chronology of late Wisconsinan glaciation in middle North America; Quaternary Science Reviews, v.1, p.55-82.

CNC-IPS (Canadian National Committee-International Peat Society) 1983. Symposium '83, energy from peat symposium; St. John's, Newfoundland, 239p.

Conklin, M.H. 1978. The potential air quality impacts of harvesting peat in Northern Minnesota; Minnesota Department of Natural Resources, Document P-4107.

Craig, A.J. 1972. Pollen influx to laminated sediments: a pollen diagram from northern Minnesota; Ecology, v.53, p.46-57.

Damman, A.W.H. 1978. Distribution and movement of elements in ombrotrophic peat bogs; OIKOS, v.30, p.480-495.

Davis, C.L. 1983. Peat; Bureau of Mines Mineral Yearbook, United States Department of the Interior, 7p.

Dendron Resource Surveys Ltd. 1986. Peat and peatland evaluation of the Longlac-Nakina area; Ontario Geological Survey, Open File Report 5542, 382p.

Dietze, G. 1981. Observations on the renewed growth of raised-bog plant communities in the Altwarmbuchener Moor near Hannover; Telma, v.11, p.189-195.

DiLabio, R.N.W. and Coker, W.B. 1982. Geochemistry of peat associated with uraniferous bedrock in the Kasmere Lake area, Manitoba; *in* Prospecting in Areas of Glaciated Terrain—1982, Canadian Institute of Mining and Metallurgy, p.79-194.

Ecologistics Ltd. 1985. Predicting the impact of climate on peat production potential in Ontario; Ontario Ministry of Energy and Ministry of Northern Affairs and Mines, 2 volumes, Summary Report, 22p., and Technical Report, 82p.

Eger, P., Lapakko, K. and Otterson, P. 1980. Trace metal uptake by peat: interaction of a white cedar bog and mining stockpile leachate; *in* Proceedings of the Sixth International Peat Congress, International Peat Society, p.542-547.

Ekman, E. 1982. Peat products; *in* Peatlands and their Utilization in Finland, Finnish Peatland Society, Finnish National Committee of the International Peat Society, p.97-100.

Ellington, A.E. and Knighton, M.D. 1984. Sphagnum moss recovery after harvest in a Minnesota bog; Journal of Soil and Water Conservation (May-June), p.209-211.

Environment Canada 1982. Canadian climate normals, 1951-80; Atmospheric Environment Service, Volumes 2, 3, 4, 5 and 6, Ottawa.

Ertugrul, A.M. and Sober, R.F. 1979. Effects of peat harvesting and gasification on air quality; *in* Management Assessment of Peat as an Energy Resource, Proceedings of Executive Conference, Institute of Gas Technology, p.173-188.

—— 1980. An introduction to environmental considerations of peat development, with reference to air and water quality; *in* Symposium Papers on Peat as an Energy Alternative, Institute of Gas Technology, p.603-616.

Falkenberg, H. 1982. Critical remarks on the peatland preservation program from the view-point of the peat industry; Telma, v.12, p.113-118.

Farnham, R.S. 1968. Classification system for commercial peat; *in* Proceedings of the Third International Peat Congress, International Peat Society, p.85-90.

—— 1979. Peatland reclamation; *in* Management Assessment of Peat as an Energy Resource, Proceedings of Executive Conference, Institute of Gas Technology, p.205-217.

Farnham, R.S., Berguson, W.E., Levar, T.E. and Sherf, D.B. 1980. Peatland reclamation—the energy crop option; *in* Symposium Papers on Peat as an Energy Alternative, Institute of Gas Technology, p.635-642.

Federation of Ontario Naturalists 1979. Why wetlands?; Ontario Naturalist, Special Publication, v.19, no.2.

Ferda, J. and Novak, M. 1976. The effect of ameliorative measures on the changes of the quality of surface and ground waters in peat soils; *in* Proceedings of the Fifth International Peat Congress, v.1, p.118-127.

Ferguson, S.A., Brown, D.D., Davies, J.C. and Pryslak, A.P. 1970. Red Lake-Birch Lake sheet, Kenora District; Ontario Department of Mines, Map 2175, scale 1:253 440.

Forsberg, C.W., Gibbons, L.N., Schellhorn, H.E., Mason, E. and Maine, F.W. 1984. The use of peat extracts/pressate as a feed stock for chemical and biochemical processes; National Research Council of Canada under the auspices of the Peat Forum, 52p.

Fuchsman, C.H. 1980. Peat, industrial chemistry and technology; Academic Press, 279p.

Gartner, J.F., Mollard, J.D. and Roed, M.A. 1981. Ontario engineering geology terrain study users' manual; Ontario Geological Survey, Northern Ontario Engineering Geology Terrain Study 1, 51p.

Glaser, P.H., Wheeler, G.A., Gorham E., and Wright Jr., H.E. 1981. The patterned mires of the Red Lake peatland, northern Minnesota: vegetation, water chemistry and landforms; Journal of Ecology, v.69, p.575-599.

Glooschenko, W.A. 1986. Monitoring the atmospheric deposition of metals by use of bog vegetation and peat profiles; *in* Toxic Metals in the Atmosphere, John Wiley and Sons Inc., p.507-533.

Glooschenko, W.A. and Capobianco, J.A. 1982. Trace element composition of northern Ontario peats; Environmental Science and Technology, v.16, p.187-188.

Glooschenko, W.A. and de Benedetti, A. 1983. Atmospheric deposition of iron from mining activities in northern Ontario; The Science of the Total Environment, v.32, p.73-79.

Glooschenko, W.A., Sims, R., Gregory, M. and Mayer, T. 1981. The use of bog vegetation as a monitor of atmospheric input of metals; *in* Atmospheric Input of Pollutants to National Waters, Ann Arbor Science, Ann Arbor, p.389-399.

Golet, F.C. 1978. Rating the wildlife value of northeastern freshwater wetlands; *in* Wetlands Functions and Values: The State of Our Understanding, Proceedings of the National Symposium on Wetlands, American Water Resources Association, p.63-73.

Gooselink, J.G. and Turner, R.E. 1978. The role of hydrology in freshwater wetland ecosystems; *in* Freshwater Wetlands, Ecological Processes and Management Potential, Academic Press, p.63-78.

Gorham, E. 1961. Factors influencing supply of major ions to inland waters, with special reference to the atmosphere; Geological Society of America Bulletin, v.72, no.6, p.795-840.

Gorham, E. and Tilton, D. 1978. The mineral content of *Sphagnum fuscum* as affected by human settlement; Canadian Journal of Botany, v.56, p.2755-2759.

Graham, R.B. 1973. Potential peat moss deposits in selected areas east and west central Ontario as determined from air photo studies, March 12, 1973; Ontario Geological Survey, on file in Mineral Deposits Section, Toronto.

—— 1979. Some peat and peat moss deposits in selected areas, districts of Nipissing, Sudbury, Algoma, Thunder Bay, and Kenora; Ontario Geological Survey, Mineral Deposit Circular 19, 132p.

Graham, R.B. and Associates Ltd. 1977. Some peat and moss deposits, Thunder Bay, Ignace area, District of Thunder Bay; Ontario Geological Survey, Open File Report 5233, 89p.

Graham, R.B. and Tibbetts, T.E. 1961. Evalation of peat moss as applied to some bogs in Southern Ontario; Canada Department of Mines and Technical Surveys, Mines Branch, Technical Bulletin 22, 100p.

—— 1964. Evaluation of peat moss in some bogs of the Rainy River District, Ontario; Canada Department of Energy, Mines and Resources, Mines Branch, Technical Bulletin 65, 85p.

Grandmaison, J. 1982. The horticultural potential of sphagnum peats, as related to their physical and physiochemical properties; *in* Symposium 82, A Symposium on Peat and Peatlands, Canadian National Committee of the International Peat Society, p.324-344.

Griffin, K.O. 1977. Paleoecological aspects of the Red Lake peatland, northern Minnesota; Canadian Journal of Botany, v.55, p.172-192.

Grigal, D.F. 1983. Impact of right-of-way construction on organic soil bulk density in the Red Lake peatland; Canadian Journal of Soil Sciences, v.63, p.557-562.

Gruen, H.A. and Lovell, C.W. 1984. Compression of peat under embankment loading; *in* Construction and Difficult Geology: Karstic Permafrost, Wetlands and Peat Deposits, United States National Research Council, Transportation Research Board, Transportation Research Record 978, p.56-59.

Grumpelt, H. 1983. Development and present state of peat coke production; *in* Recent Technologies in the Use of Peat, E. Scwheizerbart'sche Verlagsbuchhandlung, Stuttgart, p.167-197.

Guntenspergen, G., Kappel, W. and Stearns, F. 1980. Response of a bog to application of lagoon sewage: the Drummond Project—an operational trial; *in* Proceedings of the Sixth International Peat Congress, International Peat Society, p.559-562.

Gunther, J. 1983. The present state of peat production and use of peat in the Federal Republic of Germany; *in* Recent Technologies in the Use of Peat, E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, p.11-22.

Hanrahan, E.T. and Rogers, M.G. 1981. Road on peat: observations and design; Journal of the Geotechnical Engineering Division, Proceedings of the American Society of Civil Engineers, v.107 (GT10), p.1403-1415.

Harme, P. 1982. Peat as an energy source in Finland; *in* Peatlands and their Utilization in Finland, Finnish Peatland Society, Finnish National Committee of the International Peat Society, p.63-66.

Hasanen, E. 1982. Emissions from peat-fired power plants; *in* Peatlands and their Utilization in Finland, Finnish Peatland Society, Finnish National Committee of the International Peat Society, p.94-96.

Havu, S. 1982. Legislation concerning the utilization of peatlands; *in* Peatlands and their Utilization in Finland, Finnish Peatland Society, Finnish National Committee of the International Peat Society, p.114-118.

Heikurainen, L. 1982a. Peatland forestry; *in* Peatlands and their Utilization in Finland, Finnish Peatland Society, Finnish National Committee of the International Peat Society, p.53-63.

—— 1982b. The Influence of Forest Drainage on the Forest Balance in Finland; *in* A Symposium on Peat and Peatlands, Canadian National Committee of the International Peat Society, p.422-441.

Hemond, H.F. 1980. Biogeochemistry of Thoreau's Bog, Concord, Massachusetts; Ecological Monographs, v.50, no.4, p.507-526.

Henderson, R.E. and Doiron, R. 1982. Some indentification hints for field classification of peat; *in* Proceedings of the Organic Soils Mapping and Interpretations Workshop, Land Resource Research Institute, Contribution 82-44, Agriculture Canada, p.105-110.

Hills, G.A. 1959. A ready reference to the description of land in Ontario and its productivity, preliminary report; Ontario Department of Lands and Forests, Maple, Ontario, 142p.

Hills, G.A. and Pierpoint, G. 1960. Forest site evaluation in Ontario; Ontario Department of Lands and Forests, Research Branch, Technical Series, Research Report 42, 63p.

Hobbs, N.B. 1986. Mire morphology and the properties and behaviour of some British and foreign peats; Quarterly Journal of Engineering Geology, v.19, p.7-80.

Hollingshead, G.W. and Raymond, G.P. 1972. Load settlement studies of a muskeg; *in* Proceedings of the Fourth International Peat Congress, International Peat Society, v.2, p.199-208.

Houser, A.M. 1974. Wetlands—down the drain; Ontario Fish and Wildlife Review, v.13, p.7-12.

Hummel, M. 1981. Wetland wildlife values; *in* Proceedings of the Ontario Wetlands Conference, Federation of Ontario Naturalists, p.27-32.

IEC Beak Consultants Ltd. 1983. Fish and wildlife use of peatlands in Canada; National Research Council of Canada under the auspices of the Peat Forum, NRCC 21238, 56p.

Innes, D.G., and Ayres, L.D. 1971. Caramat-Pagwa River sheet, Algoma, Cochrane and Thunder Bay districts; Ontario Department of Mines, Map 2202, scale 1:253 440.

Institute of Gas Technology 1980. Symposium papers, peat as an energy alternative; Institute of Gas Technology, ITT Center, Chicago, 777p.

Ireland, R.R., Bird, C.D., Brassard, G.R., Schofield, W.B. and Vitt, D.H. 1980. Checklist of the mosses of Canada; National Museum of Natural Sciences, Ottawa, Publications in Botany, no.8, 75p.

Janssen, C.R. 1968. Myrtle Lake: a late- and post-glacial pollen diagram from northern Minnesota; Canadian Journal of Botany, v.46, p.1397-1408.

Jasieniuk, M.A. and Johnson, E.A. 1982. Peatland vegetation organization and dynamics in the western subarctic, N.W.T., Canada; Canadian Journal of Botany, v.60, p.2581-2593.

Jeglum, J.K. 1974. Relative influence of moisture-aeration and nutrients on vegetation and black spruce growth in Ontario; Canadian Journal of Forestry Research, v.4, p.114-126.

—— 1975. Vegetation—habitat changes caused by damming a peatland drainageway in northern Ontario; Canadian Field-Naturalist, v.89, p.400-412.

—— 1985. The status of peatland sites classification for forestry in Ontario; SUO, v.36, no.2, p.33-44.

Jeglum, J.K. and Boissonneau, A.N. 1977. Air photo interpretation of wetlands, northern clay section, Ontario; Canadian Forestry Service, Information Report 0-X-269, 44p.

Jeglum J.K., Boissonneau, A.N. and Haavisto, V.F. 1974. Toward a wetland classification system for Ontario; Canadian Forestry Service, Information Report 0-X-215, 54p.

Jeglum, J.K., Haavisto, V.F. and Groot, A. 1982. Peatland forestry in Ontario: an overview; *in* Symposium 82, A Symposium on Peat and Peatlands, Canadian National Committee of the International Peat Society, p.127-167.

Johnson, R. 1983. Lease site selection for peatland developments; *in* International Symposium on Peat Utilization, Bimidji State University, p.521-525.

Jones, R.K., Pierpoint, G., Wickware, G.M., Jeglum, J., Arnup, R.W. and Bowles, J.M. 1983. Field guide to forest ecosystem classification for the clay belt, site region 3E; Ontario Ministry of Natural Resources, Maple, 123p.

J. Phillip Nicholson Inc. 1984. Peat policies and activities in Canada; National Research Council of Canada under the auspices of the Peat Forum, NRCC 24353, 2 volumes.

Kalmari, A. 1982. Peat combustion; *in* Peatlands and their Utilization in Finland, Finnish Peatland Society, Finnish National Committee of the International Peat Society, p.89-96.

Kecheson, D.E. and Jeglum, J.K. 1972. Estimates of black spruce and peatland areas in Ontario; Canada Department of the Environment, Great Lakes Forest Research Centre, Information Report 0-X-172, 29p.

Keskitalo, J. 1982. Reserves of peat and ligneous material in the mires of the Sikajoki Valley and the Oulujarvi area; Nordia, v.16, no.1, p.1-109 (p.8).

Ketola, M., Luomala, E., Joutsenoja, P., and Kiimalainen, J. 1983. The organic emissions of a peat power plant; *in* International Symposium on Peat Utilization, Bimidji State University, p.205-214.

Keys, D. 1983. Summary of techniques used in the inventory of the peatlands of New Brunswick; *in* Proceedings of a Peatland Inventory Methodology Workshop, Agriculture Canada, Ottawa, and Environment Canada, p.75-87.

Keys, D., Gemmell, D.E. and Ferguson, D. 1981. New Brunswick's peat resource evaluation programme; *in* Proceedings of Symposium on Peat, An Awakening Natural Resource, Ontario Ministries of Energy, Natural Resources, and Northern Affairs, and Canadian National Committee of the International Peat Society, p.83-93.

Keyser, J.H. and Laforte, M.A. 1984a. Road construction in palsa fields; *in* Construction and Difficult Geology: Karstic, Permafrost, Wetlands and Peat Deposits, United States National Research Council, Transportation Research Board, Transportation Research Record 978, p.26-36.

—— 1984b. Construction and performance of pavement over muskegs; *in* Construction and Difficult Geology: Karstic, Permafrost, Wetlands and Peat Deposits, United States National Research Council, Transportation Research Board, Transportation Research Record 978, p.68-80.

Kilham, P. 1982. The biogeochemistry of bog ecosystems and the chemical ecology of sphagnum; Michigan Botanist, v.21, p.159-168.

Koivisto, I.J. 1985. The Wally Creek area forest drainage experiment in northeastern Ontario; SUO, v.36, no.2, p.53-57.

Korpijaakko, E.C. and Woolnough, D.F. 1977. Peatland survey and inventory; *in* Muskeg and the Northern Environment in Canada, University of Toronto Press, p.63-81.

Korpijaakko, M.L. 1981. A piston sampler for undisturbed peat samples; SUO, v.32, p.7-8.

Kreutzwiser, R. 1981. Recreational values of lakeshore marshes; *in* Proceedings of the Ontario Wetlands Conference, Federation of Ontario Naturalists, p.48-57.

Kuitunen, T. and Kuitunen, M. 1985. Endangered mire vascular plant series in the vegetation of the Kurkisuo-mire in southern Finland; SUO, v.36, no.1, p.21-30.

Kuntze, H. and Eggelsmann, R. 1981. The ability of bog preservation in northwest Germany; Telma, v.11, p.197-212.

Laine, J. and Starr, M.R. 1979. An analysis of the post-drainage stand increment in relation to the peatland site type classification in Finland; *in* Proceedings of the International Symposium on Classification of Peat and Peatlands, International Peat Society, p.147-159.

Lang, J.F. 1984. A review of the role of peat as a fuel for generation of electricity in Ireland; *in* Proceedings of the Seventh International Peat Congress, International Peat Society, v.2, p.349-370.

Lappalainen, E. 1982. Peat resources; *in* Peatlands and their Utilization in Finland, Finnish Peatland Society, Finnish National Committee of the International Peat Society, p.12-13.

Largin, I.F., Priemskaya, S.E., Sventikhovskaya, A.N. and Tyuremnov, S.N. 1972. Microelements content and distribution in peat deposits; *in* Proceedings of the Fourth International Peat Congress, International Peat Society, v.4, p.77-86.

Lefebvre, G., Langlois, P., Lupien, C. and Lavallee, J.G. 1984. Laboratory testing and *in situ* behavior of peat as embankment foundation; Canadian Geotechnical Journal, v.21, p.322-337.

LeMasters, G.S., Bartelli, L.J. and Smith, M.R. 1983. Characterization of organic soils as energy sources; *in* Testing of Peats and Organic Soils, American Society for Testing and Materials, STP 820, p.127-137.

Leverin, H.A. 1941. Peat moss deposits in Eastern Canada; Bureau of Mines, Canada Department of Mines and Resources, Memorandum Series no.80, 81p.

Levesque, M. 1982. Overview of the agricultural peatlands in Canada; *in* Symposium 82, A Symposium on Peat and Peatlands, Canadian National Committee of the International Peat Society, p.48-77.

Levesque, M. and Dinel, H. 1977. Fiber content, particle-size distribution and some related properties of four peat materials in Eastern Canada; Canadian Journal of Soil Sciences, v.57, p.187-195.

Levesque, M.P., Mathur, S.P. and Richard, P.J.H. 1982. A study of physical and chemical changes in a cultivated organic soil based on palynological synchronization of subsurface layers; Naturaliste canadien, v.109, p.181-187.

Levesque, M. and Millette, J.A. 1977. Description morphologique et aspects chimiques de la tourbiere a laiches de Farnham, Quebec; Naturaliste canadien, v.104, p.511-526.

Levesque, M., Morita, H., Schnitzer, M. and Mathur, S.P. 1980. The physical, chemical and morphological features of some Quebec and Ontario peats; Agriculture Canada, Land Resource Research Institute, Contribution no. LRRI 62, 70p.

Loftan, S.M. 1980. Heterogeneity of ecological factors affecting commercial development of selected North American peat deposits; *in* Symposium Papers on Peat as an Energy Alternative, Institute of Gas Technology, p.595-601.

Loxham, M. and Burghardt, W. 1983. Peat as a barrier to the spread of microcontaminants to the groundwater; *in* International Symposium on Peat Utilization, Bimidji State University, p.337-350.

Lucas, R.E. 1982. Organic soils (histosols) formation, distribution, physical and chemical properties and management for crop production; Michigan State University, Research Report 435.

Lucas, R.E. and Rieke, P.E. 1968. Peats for soil mixes—some air-water relationships and suggested plant nutrient standards; *in* Proceedings of the Third International Peat Congress, International Peat Society, p.261-263.

Lucas, R.E., Rieke, P.E., Shickluna, J.C. and Cole, A. 1975. Lime and fertilizer requirements for peats; *in* Peat in Horticulture, Academic Press, p.51-70.

Luttig, G.W. ed. 1983. Recent technologies in the use of peat; E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, 223p.

MacFarlane, I.C. ed. 1969. Muskeg engineering handbook; by the Muskeg Subcommittee of the National Research Council of Canada, Associate Committee on Geotechnical Research, University of Toronto Press, 297p.

Mackasey, W.O., Blackburn, C.E. and Trowell, N.F. 1974. A regional approach to the Wabigoon-Quetico belts and its bearing on exploraton in northwestern Ontario; Ontario Division of Mines, Miscellaneous Paper 58, 30p.

Martin, S.K. 1980. Effects of drainage and fertilization in soil solution in a northern Minnesota fen; *in* Proceedings of the Sixth International Peat Congress, International Peat Society, p.621-627.

McKeague, J.A. ed. 1976. Manual on soil sampling and methods of analysis; Canadian Soil Survey Committee, Soil Research Institute, Ottawa, 212p.

Midwest Research Institute 1976. A report on European peat technology; Minnesota Department of Natural Resources, St. Paul, Minnesota.

Mills, G.F. 1983. Peatland inventories in Manitoba; *in* Proceedings of a Peatland Inventory Methodology Workshop, Agriculture Canada, Ottawa, and Environment Canada, St. John's, p.35-50.

Minnesota Department of Natural Resources 1981. Minnesota peat program final report; Minnesota Department of Natural Resources, Division of Minerals, 93p. (Chapter 7, The Peatland Environment, p.47-63.)

—— 1982. Inventory of peat resources, Aitken County, Minnesota; Peat Inventory Project Report, Hibbling, Minnesota, 86p.

—— 1984. Draft 'rules relating to peatland reclamation'; Minnesota Department of Natural Resources, Division of Minerals, 30p.

—— 1985. Hydrological and water quality monitoring of a fuel-peat mine near Cotton, Minnesota; Minnesota Department of Natural Resources, Division of Minerals.

Mollard, J.D. and Janes, J.R. 1984. Airphoto interpretation and the Canadian landscape; Energy, Mines and Resources Canada, 415p. (Chapter 7, Permafrost Terrain and Peatland Features, p.117-138.)

Monenco Consultants Ltd. 1985. Production of direct burning products from peat; Ontario Ministries of Energy, and Northern Affairs and Mines, 1 volume.

Monenco Ltd. 1983. Pollution potential of peat combustion, liquefaction and gasification; Natural Research Council of Canada under the auspices of the Peat Forum, NRCC 22859, 164p.

Monenco Ontario Ltd. 1981. Evaluation of the potential of peat in Ontario; Ontario Ministry of Natural Resources, Mineral Resources Branch, Occasional Paper no.7, 193p.

—— 1983. An evaluation of alternate wet mining systems; National Research Council of Canada under the auspices of the Peat Forum, NRCC 23106, 1 volume.

—— 1986. Peat and peatland evaluation of the Dryden-Lac Seul area; Ontario Geological Survey, Open File Report 5544, 7 volumes, 226p.

Morgan, S.M. and Pollett, F.C. eds. 1983. Proceedings of a peatland inventory workshop; Agriculture Canada, Land Resource Institute, and Environment Canada, Newfoundland Forest Research Centre, 212p.

Mundale, S.M. ed. 1981. Energy from peatlands, options and impacts; Centre for Urban and Regional Affairs, University of Minnesota, Publication no. CURA 81-2, 183p.

National Research Council of Canada (NRCC) 1979. Muskeg subcommittee 1979; Peat Testing Manual, Technical Memorandum no.125, 193p.

Newland, J.L. 1980. Interpretation of organic soil properties for agriculture; *in* Proceedings of a Workshop on Organic Soil Mapping and Interpretation, Agriculture Canada, Land Resource Institute, p.69-98.

Nichols, D.S. 1980. Nutrient removal from wastewater by wetlands; *in* Proceedings of the Sixth International Peat Congress, International Peat Society, p.638-642.

Niemi, G.J., Hanowski, J.M., Kouki, J. and Rajasarkka, A. 1983. Inter-continental comparisons of habitat structure as related to bird distribution in peatlands of eastern Finland and northern Minnesota, USA; *in* International Symposium on Peat Utilization, Bimidji State University, p.59-73.

Nick, K.J. 1984. Measures and chances for success for the regeneration of bogs after the complete industrial cutting of peat; *in* Proceedings of the Seventh International Peat Congress, International Peat Society, v.1, p.331-339.

Northland Associates Ltd. 1984. Peat and peatland evaluation of the Rainy River area; Ontario Geological Survey, Open File Report 5489, 9 volumes.

Odum, E.P. 1978. The value of wetlands: a hierarchical approach; *in* Wetland Functions and Values: The State of Our Understanding, Proceedings of the National Symposium on Wetlands, American Water Resources Association, p.16-25.

Oldfield, F., Tolonen, K. and Thompson, R. 1981. History of particulate atmospheric pollution from magnetic measurements in dated Finnish peat profiles; Ambio, v.10, no.4, p.185-188.

Ontario Bureau of Mines 1892. Peat, its use and value for fuel; *in* First Report of the Bureau of Mines, 1891, p.180-211.

—— 1893. The utilization of peat; *in* Second Report of the Bureau of Mines, 1892, p.192-220.

Ontario Chapter, Soil Conservation Society of America 1981a. Watershed planning and management; 117p. (Available T. Kurtz, 38 Wildrose Crescent, Thornhill, Ontario.)

—— 1981b. Erosion and sedimentation in Ontario—a time for action; 124p. (Available T. Kurtz, 38 Wildrose Crescent, Thornhill, Ontario.)

Ontario Ministry of Natural Resources 1984. Guidelines for wetlands management in Ontario; Ontario Ministry of Natural Resources, Wildlife Branch, Toronto, 3p.

Ontario Ministry of Natural Resources and Environment Canada 1984. An evaluation system for wetlands of Ontario south of the Precambrian Shield; Wildlife Branch, Ontario Ministry of Natural Resources, and Canadian Wildlife Service, Environment Canada, 2nd ed., 169p.

Ontario Research Foundation 1984. Wastewater characteristics of five peat dewatering processes; National Research Council of Canada under the auspices of the Peat Forum, NRCC 23758, 139p.

Osborne, J.M. 1982. Potential environment impact of peatland development; *in* Symposium 82, A Symposium on Peat and Peatlands, Canadian National Committee of the International Peat Society, p.198-219.

Pakarinen, P. 1978. Production and nutrient ecology of three Sphagnum species in southern Finnish raised bogs; Acta Botanica Fennici, v.15, p.15-26.

Pakarinen, P. and Gorham E. 1983. Mineral element composition of *Sphagnum fuscum* peats collected from Minnesota, Manitoba and Ontario; *in* Proceedings of International Symposium on Peat Utilization, Bimidji State University, p.417-429.

Pakarinen, P., Tolonen, K. and Soveri, J. 1980. Distribution of trace metals and sulphur in the surface peat of Finnish raised bogs; *in* Proceedings of the Sixth International Peat Congress, International Peat Society, p.645-648.

Pala, S. 1982. A method for peat inventory based on LANDSAT data and computerized mapping; *in* Symposium 82, A Symposium on Peat and Peatlands, International Peat Society, p.266-290.

Pala, S. and Boissonneau, A. 1982. Wetland classification maps for the Hudson Bay Lowland; Naturaliste canadien, v.109, p.653-659.

—— 1985. Peatland resources inventory northwest of Timmins using remote sensing and ground reconnaissance 1982; Ontario Geological Survey, Open File Report 5567, 100p.

Pala, S. and Weischet, W. 1982. Towards a physiographic analysis of the Hudson Bay Lowland; Naturaliste canadien, v.109, p.637-651.

Pavainen, J. 1985. Potential of peatlands for forest drainage in Canada; SUO, v.36, no.2, p.45-52.

Pavainen, J. and Wells, E.D. 1977. Guidelines for the development of peatland drainage systems for forestry in Newfoundland; Canada Department of Fisheries and Environment, Newfoundland Forest Research Centre, Information Report N-X-156, 44p.

Payandeh, B. 1982. Five-year growth response of northern Ontario peatland black spruce to fertilization and drainage; Canada Department of the Environment, Great Lakes Forest Research Centre, Information Report O-X-340, 20p.

Phantom Exploration Services Ltd. 1985. Peat and peatland evaluation of the Sioux Lookout area; Ontario Geological Survey, Open File Report 5543, 4 volumes, 275p.

Pollett, F. 1968. Peat resources of Newfoundland; Province of Newfoundland and Labrador Department of Mines, Agriculture and Resources, Mines Branch, Mineral Resource Report No.2.

Predmore, S.R. and Brooks, K.N. 1980. Predicting peat mining impacts on water resources—a modeling approach; *in* Proceedings of the Sixth International Peat Congress, International Peat Society, p.655-661.

Prest, V.K. 1970. Quaternary geology of Canada; *in* Geology and Economic Minerals of Canada, Geological Survey of Canada, Economic Geology Report no.1, p.667-764.

Proctor and Redfern Group Ltd. 1984. Peat and peatland evaluation of the Ignace area; Ontario Geological Survey, Open File Report 5487, 6 volumes, 209p.

Punwani, D.V. and Lau, F.S. 1981. Review of peat gasification and liquefaction research; *in* Proceedings of Symposium on Peat, An Awakening Natural Resource, Ontario Ministries of Energy, Natural Resources and Northern Affairs, and Canadian National Committee of the International Peat Society, p.273-298.

Punwani, D.V., Rader, A.M. and Kopstein, M.J. 1983. Development and status of the I.G.T. Peatgas T.M. Process for production of synthetic fuels from peat; *in* Recent Technologies in the Use of Peat, E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, p.105-125.

Puustjarvi, V. 1979. Classification of virgin peat with regard to the requirements of horticultural peat use; *in* Classification of Peat and Peatlands, Proceedings of the International Symposium, International Peat Society, p.239-242.

Puustjarvi, V. and Robertson, R.A. 1975. Physical and chemical properties; *in* Peat in Horticulture, Academic Press, p.23-38.

Pyke, D.R. and Fenwick, K.G. 1965. Atikoken-Lakehead sheet, Kenora, Rainy River and Thunder Bay districts; Ontario Department of Mines, Map 2065, scale 1:235 440.

—— 1972. Manitouwadge-Wawa sheet, Algoma, Cochrane, Sudbury and Thunder Bay districts; Ontario Division of Mines, Map 2220, scale 1:253 440.

Radforth, N.W. and Brawner, C.O. eds. 1977. Muskeg and the northern environment in Canada; Muskeg Subcommittee of the National Research Council Associate Committee on Geotechnical Research, University of Toronto Press, Toronto, 399p.

Raymond, G.P., Wood, E.A. and Hollingshead, G.W. 1972. Consolidation of undisturbed fine fibrous peat; *in* Proceedings of the Fourth International Peat Congress, International Peat Society, v.2, p.209-220.

Reader, R.J. 1978. Primary productivity in northern peat marshes; *in* Freshwater Wetlands, Ecological Processes and Management Potential, Academic Press, p.53-62.

Rees, H.W. ed. 1982. Proceedings of the organic soils mapping and interpretation workshop; Agriculture Canada, Research Branch, Land Resource Research Institute Contribution no.82-44, 216p.

Richard, P. 1980. Histoire postglaciaire de la vegetation au sud du lac Abitibi, Ontario et Quebec; Geographie Physique et Quaternaire, v.34, no.1, p.77-94.

Richardson, C.J. 1978. Primary productivity values in fresh water wetlands; *in* Wetland Functions and Values: The State of our Understanding, Proceedings of the National Symposium on Wetlands, American Water Resources Association, p.131-144.

Riihimaki, H., Pekkarinen, M., Husman, K., Kangas, J., Itkonen, A., Mattsson, T. and Zitting, A. 1980. Exposure to dust and its effects on the respiratory system in peat production; *in* Proceedings of the Sixth International Peat Congress, International Peat Society, p.317-320.

Riley, J.L. 1982. Hudson Bay Lowland floristic inventory, wetlands catalogue and conservation strategy; Naturaliste canadien, v.109, p.543-555.

—— 1983. Peatland inventory project; *in* Summary of Field Work 1983, Ontario Geological Survey, Miscellaneous Paper 116, p.15-121.

—— 1984a. Peatland inventory project, 1984; *in* Summary of Field Work 1984, Ontario Geological Survey, Miscellaneous Paper 119, p.110-116.

—— 1984b. Peatland inventory project specifications, 1984; Manuscript on File, Engineering and Terrain Geology Section, Ontario Geological Survey, Toronto, 141p.

—— 1989a. Laboratory methods for testing peat—Ontario peatland inventory project; Ontario Geological Survey, Miscellaneous Paper 145.

—— 1989b. Southern Ontario bogs and fens of the Canadian Shield; *in* Wetlands: inertia or momentum, Federation of Ontario Naturalists, Don Mills, p.355-367.

Ritchie, J.C. 1983. The paleoecology of the central and northern parts of the glacial Lake Agassiz basins; *in* Glacial Lake Agassiz, Geological Association of Canada, Special Paper 26, p.157-170.

Robertson, J.A. 1975. Mineral deposit studies, mineral potential evaluation and regional planning in Ontario; Ontario Division of Mines, Miscellaneous Paper 61, 42p.

Rosen, M. 1984. Water flows in peatland; Ontario Ministry of Natural Resources, On Line to Northern Forest Developments, v.1, no.2, p.1-3.

Rowe, J.S. 1972. Forest regions of Canada; Department of Environment, Canadian Forestry Service, Publication 1300, 172p.

Rowe, R.K., MacLean, M.D. and Barsvary, A.K. 1984. The observed behavior of a geotextile-reinforced embarkment constructed on peat; Canadian Geotechnical Journal, v.21, p.289-304.

Ruuhijarvi, R. 1982. Mire preservation; *in* Peatlands and their Utilization in Finland; Finnish Peatland Society, Finnish National Committee of the International Peat Society, p.109-113.

Rycroft, D.W., Williams, D.J.A. and Ingram, H.A.P. 1975. The transmission of water through peat, I, review; Journal of Ecology, v.63, p.535-556.

Salmi, M. 1967. Peat in prospecting applications in Finland; *in* Geochemical Prospecting Fennoscandia, Interscience Publishers, New York, p.113-126.

Schmatzler, E. 1981. Final additional investigations on raised bogs in Lower Saxony in respect to their protection value; Telma, v.11, p.241-245.

Schwintzer, C.R. 1978. Vegetation and nutrient status of northern Michigan fens; Canadian Journal of Botany, v.56, p.3044-3051.

—— 1979. Vegetation changes following a water level rise and tree mortality in a Michigan bog; Michigan Botanist, v.18, p.91-98.

—— 1981. Vegetation and nutrient status of northern Michigan bogs and conifer swamps with a comparison to fens; Canadian Journal of Botany, v.59, p.842-853.

Schwintzer, C.R. and Tomberlin, T.J. 1982. Chemical and physical characteristics of shallow ground waters in northern Michigan bogs, swamps and fens; American Journal of Botany, v.69, p.1231-1239.

Scott, J.B., Korpijaakko, E.O. and Tibbetts, T.E. 1980. Development of conversion factors for expressing peat resources estimates; *in* Symposium Papers on Peat as an Energy Alternative, Institute of Gas Technology, p.27-49.

Selin, P., Unkuri, J., Lehtovaara, J. and Nyronen, T. 1984. Plans to reduce the effects of peat excavation on water quality; *in* Proceedings of the Seventh International Peat Congress, International Peat Society, v.3, p.38-50.

Shaw, S.P. and Fredine, C.G. 1956. Wetlands of the United States. Their extent and their value of waterfowl and other wildlife; United States Fish and Wildlife Service, Department of the Interior, Circular 39, 67p.

Shay, J. 1981. Wetland protection in the 80's; *in* Proceedings of the Ontario Wetlands Conference, Federation of Ontario Naturalists, p.19-25.

Sheppard, J. 1984. The Technical Research Centre and the peat industry in Finland; National Research Council, Energy Division, NRCC 23014, 110p.

Sheppard, J.D., Musial, J.,and Tibbetts, T.E. eds. 1982. Symposium 82, a symposium on peat and peatlands, Shippagan, New Brunswick; Canadian National Committee of the International Peat Society, 582p.

Siegel, D.I. 1979. Potential hydrologic effects of peat mining in the Red Lake peatlands, north-central Minnesota—a project plan; United States Department of the Interior Geological Survey, Open File Report 79-1591, 9p.

Sipala, K., Edman, E. and Asplund, D. 1983. Production of activated carbon from Finnish peat coke; *in* Recent Technologies in the Use of Peat, E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, p.199-207.

Sloey, W.E., Spangler, F.L., and Fetter, C.W. Jr. 1978. Management of freshwater wetlands for nutrient assimilation; *in* Freshwater Wetlands, Ecological Processes and Management Potential, Academic Press, p.321-340.

Smith, D.L. 1984. Method for wetland functional assessment; *in* United States National Research Council, Transportation Research Board, Transportation Research Record 969, p.17-23.

Smith, R.B. 1980. Expanding cranberry production in Ontario; Ontario Ministry of Agriculture and Food, Highlights of Agricultural Research in Ontario, v.3, no.4, p.7-9.

Solovyeva, V.P. and Lotosh, T.D. 1984. Biologically active peat substances—body resistance stimulations; *in* Proceedings of the Seventh International Peat Congress, International Peat Society, v.4, p.428-433.

Stanek, W. 1976. Annotated bibliography of peatland forestry; Environment Canada Libraries, Bibliographic Series 76/1, 35p.

—— 1977. A list of terms and definitions; *in* Muskeg and the Northern Environment in Canada, University of Toronto Press, Toronto, p.367-387.

Stanek, W. and Jeglum, J.K. 1977. Comparisons of peatlands using macro-nutrient contents of peat; Vegetation, v.33, p.163-173.

Stocking, J. 1981. Peat and the Ontario Mining Act; *in* Proceedings of Symposium on Peat, An Awakening Natural Resources, Ontario Ministries of Energy, Natural Resources, and Northern Affairs, and Canadian National Committee of the International Peat Society, p.337-343.

Strecker, O. and Gyarmati, J. 1980. The results of the bacteriological analysis of the Heviz peat-curative mud; *in* Proceedings of the Sixth International Peat Congress, International Peat Society, p.694.

Suoninen, A. 1982. Peat production; *in* Peatlands and their Utilization in Finland, Finnish Peatland Society, Finnish National Committee of the International Peat Society, p.67-88.

Szilagyi, M. 1973. The redox properties and the determination of the normal potential of a peat-water system; Soil Science, v.115, no.6, p.434-437.

Telford, P.G. 1983. Peat resource evaluation program, Province of Ontario; *in* Proceedings of a Peatland Inventory Methodology Workshop, Agriculture Canada, Ottawa, and Environment Canada, St. John's, p.51-53.

Teller, J.T. 1985. Glacial Lake Agassiz and its influence on the Great Lakes; *in* Quaternary Evolution of the Great Lakes, Geological Association of Canada, Special Paper 30, p.1-16.

Terasmae, J. 1967. Postglacial chronology and forest history in the northern Lake Huron and Lake Superior regions; *in* Quaternary Paleoecology, Volume 7 of the Proceedings of the Seventh Congress of the International Association for Quaternary Research, National Academy of Sciences-National Research Council, p.45-58.

—— 1968. A discussion of deglaciation and the boreal forest history in the northern Great Lakes region; Proceedings of the Entomological Society of Canada, v.99, p.31-43.

Terasmae, J. and Anderson, T.W. 1970. Hypsithermal range extension of white pine (*Pinus strobus* L.) in Quebec, Canada; Canadian Journal of Earth Sciences, v.7, p.406-413.

Thibodeau, F.R. and Ostro, B.D. 1981. An economic analysis of wetland protection; Journal of Environmental Management, v.12, p.19-30.

Thun, R., Fagernas, L. and Brandt, J. 1983. Use of thermally treated peat for water purification; *in* International Symposium on Peat Utilization, Bimidji State University, p.365-379.

Tibbetts, T.E. 1983. The peat forum and the peat for energy and chemicals research and development program; *in* Proceedings of a Peatland Inventory Methodology Workshop, Agriculture Canada, Land Resource Research Institute, and Environment Canada, Newfoundland Forest Research Center, p.i-iv.

Tibbetts, T.E. and Telford, P.G. eds. 1981. Proceedings of symposium on peat, an awakening natural resource, Thunder Bay, Ontario, October 26-28, 1981; published by Ontario Ministries of Energy, Natural Resources, and Northern Affairs, and Canadian National Committee of the International Peat Society, 425p.

Tiner, R.W. 1984. Wetlands of the United States: current status and recent trends; United States Department of the Interior, Fish and Wildlife Service, Habitat Resources, 59p.

Toth, A. 1980. Utilization of peatland for purification and emplacement of communal sewage mud; *in* Proceedings of the Sixth International Peat Congress, International Peat Society, p.711-712.

Turverukki Oy Ltd. 1982. Peat production plan for the Galbraith Bog, District of Algoma; Ontario Geological Survey, Open File Report 5393, 104p.

Urquhart, C. and Gore, A.J.P. 1973. The redox characteristics of four peat profiles; Soil Biology and Biochemistry, v.5, p.659-672.

Valk, M. 1982. Management of muck crops; *in* Symposium 82, A Symposium on Peat and Peatlands, Canadian National Committee of the International Peat Society, p.368-390.

—— 1980. Management of organic soils; Ontario Ministry of Agriculture and Food, Fact Sheet Agdex 512.

Valmari, A. 1982. Agriculture utilization of peatland; *in* Peatlands and their Utilization in Finland, Finnish Peatland Society, Finnish National Committee of the International Peat Society, p.42-49.

van der Molen, W.H. 1981. Width of hydrological buffer zones around peatland reserves; Telma, v.11, p.213-220.

van der Valk, [illegible], Davis, C.B., Baker, J.L. and Beer, C.E. 1978. Natural freshwater wetlands as nitrogen and phosphorus traps for land runoff; *in* Wetland Functions and Values: the State of our Understanding, American Water Resources Association, p.457-467.

Van Patter, M. and Hilts, S. 1985. Some important wetlands of Ontario south of the Precambrian Shield; Federation of Ontario Naturalists, Don Mills, 103p.

Vincent, J.S. 1973. A palynological study of the Little Clay Belt, northwestern Quebec; Naturaliste canadien, v.100, p.59-70.

Vitt, D.H. and Bayley, S. 1984. The vegetation and water chemistry of four oligotrophic basin mires in northwestern Ontario; Canadian Journal of Botany, v.62, p.1485-1500.

Vitt, D.H. and Slack, N.G. 1975. An analysis of the vegetation of Sphagnum-dominated kettle-hole bogs in relation to environmental gradients; Canadian Journal of Botany, v.53, p.332-359.

Walmsley, M.E. 1977. Physical and chemical properties of peat; *in* Muskeg and the Northern Environment in Canada, University of Toronto Press, Toronto, p.82-129.

Walters, A.B., King, R.J. and Richardson, S.I. 1980. Environmental issues and strategies for peat energy development in the U.S.; *in* Symposium Papers on Peat as an Energy Alternative, Institute of Gas Technology, p.581-593.

Washburn and Gillis Assoc. Ltd. 1982. Survey of literature on the assessment of pollution potential of the peat resource; National Research Council of Canada under the auspices of the Peat Forum, NRCC 22859, 1 volume.

—— 1983a. Identification of the pollution of the harvesting and preutilization processing of peat as an energy commodity; National Research Council of Canada under the auspices of the Peat Forum, NRCC 22858, 75p.

—— 1983b. Evaluation of data from 1982 sampling program of potential pollutants in water and peat samples from three peat bogs in Canada; National Research Council of Canada under the auspices of the Peat Forum, NRCC 23214, 43p.

Weatherson, G.L. 1985. 1984 Ontario Mineral Score; Ontario Ministry of Natural Resources, Video Census Series no.4, 258p.

Wells, E.D. and Pollett, F.C. 1983. Peatland inventories for Newfoundland: methodology and application; *in* Proceedings of a Peatland Inventory Workshop, Agriculture Canada, Ottawa, and Environment Canada, St. John's, p.25-30.

Williams Bros. Engineering Co. 1979. Peat and the environment; *in* Management Assessment of Peat as an Energy Resource, Proceedings of Executive Conference, Institute of Gas Techology, p.241-256.

Worley, I.A. 1984. Axiological and ethical factors in peatland preservation and use in the United States; *in* Proceedings of the Seventh International Peat Congress, International Peat Society, v.2, p.49-61.

Zoltai, S.C. 1961. Glacial history of part of northwestern Ontario; *in* Proceedings of the Geological Association of Canada, v.13, p.61-83.

—— 1965a. Glacial features of the Quetico-Nipigon area, Ontario; Canadian Journal of Earth Sciences, v.2, p.247-269.

—— 1965b. Kenora-Rainy River, surficial geology; Department of Lands and Forests, Map S165, scale 1:506 880.

—— 1965c. Thunder Bay, surficial geology; Department of Lands and Forests, Map S265, scale 1:506 880.

—— 1967. Glacial features of the north-central Lake Superior region, Ontario; Canadian Journal of Earth Sciences, v.4, p.515-528.

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